HOOPER'S

PHYSICIAN'S VADE MECUM:

OR,

A Manual of the Principles and Practice of Physic.

FOURTH EDITION,
CONSIDERABLY ENLARGED AND IMPROVED:

WITH

AN OUTLINE OF GENERAL PATHOLOGY AND THERAPEUTICS.

BY

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AUTHOR'S PREFACE.

THE following concise account of the several diseases that fall under the province of the Physician was committed to the press, with the hope of its proving useful to students, and those practitioners in medicine who, from their professional occupations, or other circumstances, may not have it in their power to consult the more voluminous works that have contributed so much to the improvement of medicine.

The very extensive sale of the work, and its having been translated into most of the continental languages, induce the Author to believe that his labours have been generally approved.

It has been his object to compress, within a smaller compass than has hitherto been done, consistently with utility, everything which more especially deserves attention with a view to the treatment of diseases. In pursuing this design, he has discarded all theory, and retained only those leading facts with which it is absolutely necessary for a practitioner to be acquainted when he approaches the bedside of his patient.

Under distinct heads are arranged—

1. The characteristic symptoms by which diseases are known.
2. The causes from which they most frequently have their origin.
3. The circumstances that more especially point out the difference between diseases which resemble one another.

4. The signs which influence the judgment in forming a prognosis of their event.
5. That mode of treatment which, in the present improved state of medicine, is deemed most appropriate, and which experience has sanctioned.

The select collection of Formulæ, Glossary of Terms, and the Table showing the Doses of all valuable medicines he employed, will, the Author trusts, combine to render the volume more extensively useful

Saville Row, August 1823.

EDITOR'S PREFACE.

A WORK to which the familiar name of Dr. Hooper is attached must of necessity find its way into the hands of many readers. This consideration gives to the present publication an importance which its small size and unpretending character would scarcely claim for it; and it is this which induced the present Editor to undertake the task of preparing it for the press.

From the Author's Preface, it appears that the only object contemplated in the first editions of this work, was that of furnishing a concise treatise on the practice of medicine for the use of the student and practitioner. After the Author's death, however, an Introductory Part was added, containing a short outline of Physiology, Pathology, and Therapeutics, some brief directions for Clinical Examination, and a sketch of Symptomatology and Semeiology. This part, which did not occupy more than sixty-five pages, has been entirely re-written by the present Editor.

In its present form, therefore, this work consists of two parts, corresponding to what is commonly understood by the terms General and Special Pathology and Therapeutics.

The First Part consists of four chapters. The first chapter, headed "Health and Disease," consists partly of definitions and explanations of terms, and partly of practical observations on the circumstances which exert the strongest influence on the human body in its healthy and morbid state. An outline of Physiology and General Pathology forms the subject of the second chapter, in which an attempt is made to bring together some of those facts and theories that admit, either directly or indirectly, of practical application. Those functions of the body which attract most attention at the bedside, and those methods of examination which are of most constant application, form the subjects of the third chapter. They are the examination of the blood and urine; of the chest and abdomen; of the pulse and respiration. In this part of the work, the object of the Editor has been to furnish the most exact information concerning the functions of the body in a state both of health and disease; and with this view he has embodied his own original observations on the pulse and respiration. The last chapter contains a brief outline of General Therapeutics.

Throughout this First Part, the Editor's object has been to make the work useful as a book of reference at the bedside; at the same time that he has endeavoured so to connect its several parts as to offer some inducement to the reader to study it as a whole.

In the Second Part, which answers to the original work, very extensive alterations have been made. Cullen's nosology has been laid aside, and an arrangement has been adopted which brings together the diseases that affect the same organs, or are otherwise nearly allied to each other. No attempt has been made to form a nosological system, but the diseases are, for the sake of convenience, thrown together in separate chapters.

Many liberties have been taken with the text, as it came into the hands of the present Editor. The prescriptions have been brought together at the end, and carefully arranged under distinct heads, instead of being scattered through the body of the book; many parts of the work have been so much shortened as to admit of the introduction of a great number of diseases not described in former editions; many others which were only incidentally mentioned are treated under separate heads; and a still greater number have been so much altered as to be nearly new.

Among the additions to the Second Part made by the present Editor, in the first of the four editions entrusted to his care, may be mentioned, general observations on continued fevers, puerperal fevers, plague, muscular rheumatism, neuralgia, cephalalgia; and among the diseases which underwent the greatest alteration, infantile fever, diarrhœa, hydrophobia, laryngitis, asthma, phthisis, diabetes.

In the second edition, still more extensive alterations and additions were made. Many diseases, not described in any former edition, were added; many others were materially curtailed by the omission of observations not having a practical bearing, and the work was increased by a brief description of the diseases of the eye, ear, and skin.

In the third edition, also, great additions and alterations were made. The First Part was revised and in more than one place re-written, extended from 163 to 209 pages, enriched with several woodcuts (chiefly illustrative of urinary deposits), and by a short account of the principal remedial measures generally embodied in the term "Hygiène." In the Second Part, several diseases were re-written; of which the most important are gangrene of the mouth and Asiatic cholera; others were brought into greater prominence by being placed under distinct heads; and extensive alterations, required by the improved state of medical science and practice, were made.

The Formulæ, also, were carefully revised, and received several important additions; and the several classes of Prescriptions were, for the first time, preceded by a list of all the most important preparations of the London Pharmacopœia, together with their doses.

In consequence of these additions to the First and Second Parts, the third edition of the work was extended from 523 to 576 pages.

The additions and improvements made in the present edition are, perhaps, more extensive than those which were introduced into any former edition. Several additional woodcuts, and much new matter, will be found in the First Part. With the exception of three illustrations placed at the disposal of the Editor by the proprietor of the translation of Valentin's Text-Book of Physiology, the woodcuts have been prepared for this work. Much of the new matter, and the chief improvements in the First Part, will be found in the Chapter on the Examination of the Heart and Lungs. The changes in the Second Part consist of some transposition of the early Chapters, and the addition of two new Chapters, the one treating of parasitic animals, and the other on the symptoms and treatment of poisoning by the three leading classes of poisons. The former of these Chapters is illustrated by woodcuts.

The Formulæ, and the list of preparations of the London Pharmacopœia, have been revised, and the antidotes for the poisons have been added. The Glossary of Terms which existed in the original work of Dr. Hooper has also been restored. The additions and alterations which have been made in this Edition have extended the work still further from 576 to 660 pages.

The Editor has referred in the body of the work to those authors to whom he is under the greatest obligations. In this place it will suffice to refer more particularly to Dr. Baly's translation of Müller's Physiology, Dr. Day's translation of Simon's Animal Chemistry, Dr. Watson's admirable lectures on the Principles and Practice of Physic, and the many excellent practical treatises in the Encyclopædia and Library of Practical Medicine.

Original observations or practical remarks, embodying the results of the Editor's own experience, are distinguished by the initial G.

WILLIAM A. GUY.

26, *Gordon Street,*
November 1853.

INTRODUCTION.

THIS book is intended to be, in the widest and truest sense of the term, a practical work; that is to say, it aims at bringing together, in a small compass, and in a form easy of reference, those items of information which the practitioner would desire to possess when he stands at the bedside, or when he studies an individual case with a view to its treatment.

The first and most obvious requisite for a practitioner is the facility of recognizing a disease when he sees it, of distinguishing it from others which resemble it, and of foretelling its probable course and termination. The treatment which he adopts will be judicious in proportion to the readiness with which he recognises, and the accuracy with which he discriminates the disease; and will be either rational or empirical, according as he does or does not understand its real nature and true cause.

But a facility of recognizing and discriminating diseases, a knowledge of their nature and causes, of their ordinary course and termination, and of their appropriate treatment, though essential to sound and successful practice, are not the only qualifications for it. There is a vast amount of information of a truly practical character, which does not find a place in formal descriptions of individual diseases, though comprising all these particulars. Such descriptions must be regarded either as condensed histories of the more perfect forms of disease, or as abstracts of the leading features observed in the ordinary run of cases, with an occasional notice of the more remarkable exceptions to the rule; but age, sex, and original and acquired peculiarity of constitution, give rise to differences in health, or habitual departures from it, which, in a remarkable manner, affect the severity and even the character of diseases. Hence a knowledge of the mode and degree in which both health and disease are affected by difference of age and sex and by constitution, whether original or acquired, is not less essential to safe and successful practice than is a special description of diseases themselves.

The list of the necessary acquirements of the practical physician, however, is not yet complete. It often happens that, at the bedside, great importance attaches to an individual symptom, and questions occur in relation to it, which are not, and cannot be, answered in the short space devoted to the description of the disease of which it forms a part. The symptom may be common to several diseases, or it may be a question whether, though assumed to be a symptom of disease, it be not compatible with health. Moreover, there are many symptoms or signs of disease which are detected only by very close examination, and by the use of instruments or of chemical tests; and in using these instruments and applying those tests, many precautions are necessary that are not easily borne in mind, and with regard to which the practitioner may often require to refresh his memory.

One other consideration suggests itself in this place. No man, whatever his pursuit, deserves the name of a practical man whose knowledge and resources are limited by the experience of those who have gone before him. In all employments, and in none more than in the practice of medicine, new events and rare combinations are continually presenting themselves, which can only be understood and successfully encountered by the aid of general principles. Hence the necessity for the physician of a knowledge of pathology and therapeutics, which supply the general principles that are to guide him in treating cases of disease, or complications of which he has no previous experience.

A physician who is well versed in all these particulars may lay claim to the title of *learned* in its best sense; if he have made this knowledge his own by diligent observation at the bedside, and by the constant use of instruments and application of tests, by which alone the value of symptoms can be determined, he will have earned for himself the name of *experience*; and if to learning and experience he unite the faculty of prompt and ready use of the knowledge which he has acquired, he is truly a *practical physician.*

A very wide and comprehensive meaning is here given to the terms *learning* and *experience*, and to the phrase *practical physician.* Indeed, it is of the first importance that these words should not be used in a low and vulgar sense. It is too much the custom to call a man a practical physician because he gives no time or attention to anything but the routine duties of his profession; and to deny him that title if he devote his leisure to what are termed scientific pursuits, even though these pursuits should be in immediate connexion with, and have a direct bearing upon, practice. A strong conviction that no man is truly practical who is not also possessed of an extensive scientific knowledge of his profession, has presided over the preparation of this work, and has induced the Editor to extend it beyond the limits usually assigned to a so-called practical treatise.

In order fully to carry out the practical views here indicated, this work is divided into two distinct parts, of which the first embraces, in a connected form, those more general considerations that make up the sciences of General Pathology and Therapeutics, while the second contains, in a form easy of reference, a description of diseases, their diagnosis and prognosis, their rationale, and their treatment, or what is usually known as the Practice of Medicine.

The First Part is divided into chapters, under the following titles:—1. *Health and Disease*, comprising such general observations upon either as shall seem to have the most practical bearing; pointing out the way in which both are varied by age, sex, temperament, and mode of life, and concluding by an explanation of the terms in most common use for distinguishing diseases from each other, and giving precision to our views and statements concerning them. 2. *Outline of Physiology and General Pathology.*—In this chapter those facts and theories which have the most direct bearing upon the practice of medicine are brought together, and briefly stated, all unnecessary discussions being carefully avoided; and the more important and minute details being reserved for—3. *Examination of some of the more important Symptoms and Signs of Disease*, comprising the Blood, the Urine, the Viscera of the Abdomen and of the Chest, the Pulse, and Respiration; and 4. *An Outline of General Therapeutics*, which comprises such general principles as have been laid down for the preservation and improvement of health and the treatment of disease, together with a classification of the principal remedies, and an account of their mode of operation.

The Second Part, or the Practice of Medicine, properly so called, is also distributed into chapters as follows:—1. States of System, as distinguished from diseases properly so called. 2. Local Diseases, affecting all or several of the organs or textures of the body. 3. Febrile diseases, without essential local complication. 4. Febrile diseases, with essential local complication. 5. Febrile diseases, arising from local causes. 6. General diseases (not febrile), with essential local complication.

The remainder of the diseases are distributed into eight chapters, as follows:—1. Diseases of the nervous system. 2. Diseases of the organs of circulation. 3. Diseases of the organs of respiration. 4. Diseases of the primæ viæ, organs of digestion, and chylopoietic viscera. 5. Diseases of the urinary organs. 6. Diseases of the organs of generation. 7. Diseases of the organs of sense. 8. Diseases of the skin and its appendages. 9. Parasitic animals; and 10. Poisons.

The Second Part is brought to a close by an extensive collection of Formulæ, preceded by a table of the doses of medicines; classified lists of the principal preparations of the Pharmacopœia, with their doses; and the antidotes to the principal poisons.

A glossary and an extensive index complete the volume.

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GENERAL PATHOLOGY AND THERAPEUTICS.

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THE

PHYSICIAN'S VADE MECUM.

CHAPTER I.

ON HEALTH AND DISEASE.

1. **Health** admits neither of definition nor description; of none, at least, which can be applied to any useful purpose. If we define it as the integrity of every structure, and the perfect and harmonious play of every function, we give a true definition, but not a useful one. The more lengthened description in which some writers have indulged answers no better end, for it establishes no standard of comparison, and that is what we are in want of. Perfect health, like perfect beauty, is perhaps an ideal compounded of the perfections of many different individuals; or if it exist, it falls to the lot of few, and its phenomena have met with no accurate description.

2. Health, in its more usual acceptation, is a variable condition. It differs widely in different persons, and in the same person at different times. The terms "*perfect*," "*good*," "*strong*," "*robust*," "*feeble*," "*delicate*," applied to health, show how generally this difference in degree is recognised. In strict propriety of language, perhaps, there is but one condition of the human body to which the term health can be applied, all others being deviations, more or less wide, from that condition; but for practical purposes, it is well to understand that there may be very great and marked departures from the ideal standard of perfect health, to which, nevertheless, the terms disorder or disease would be inapplicable.

3. The differences now alluded to are differences in degree of health—such differences as may exist in the same person at different times, or in persons bearing the closest external resemblance to each other;—but there are also differences in kind, which correspond more or less closely to peculiarities of external form, and indicate a tendency to particular diseases, or to a peculiar character attaching to all the diseases to which the person may become subject. These differences have long been recognised under the name of *Temperaments*—a term

necessarily wanting in precision, but, like many others in common use among medical men, embodying a useful generalization.

4. Four temperaments are generally recognised—the *sanguine*, the *phlegmatic*, the *bilious*, and the *nervous*.

5. The *sanguine* temperament is characterised by moderate plumpness of person and firmness of flesh. The hair is red or light chesnut, the eyes blue, the complexion fair and florid, and the skin soft and thin. The blood-vessels are large, the circulation active, and the pulse full and frequent. The countenance is animated, the movements quick, the passions excitable, the mind volatile and unsteady.

6. The *Phlegmatic* or *lymphatic* temperament is distinguished by roundness of form, softness of the muscles, and repletion of the cellular tissue. The hair is fair, the eyes light blue, gray, or hazel, the skin pale, the lips fleshy, and the face and person wanting in character and expression. The blood-vessels are small, the circulation languid, and the pulse infrequent. All the functions, bodily and mental, are torpid.

7. The *bilious* temperament is recognised by moderate fulness and much firmness of flesh, with harshly-exptessed outlines of the person, strongly-marked features, and decided expression of countenance. The hair and eyes are dark brown or black, and the complexion swarthy. The vascular system is largely developed, and the superficial veins are unusually prominent. The pulse is full, firm, and of moderate frequency. There is much energy of character, with great power of endurance and permanence of impressions, physical and mental.

8. The *nervous* temperament is distinguished by a small spare form, with soft and slender muscles. The features are delicate, the hair fair, and the complexion pale or slightly tinged with red; the lips thin, and the eyes bright and sparkling. The pulse is small, frequent, and quick, and easily excited by mental emotions or nervous impressions. The whole nervous system, including the brain, is active, the senses are acute, the thoughts and movements quick, and the imagination lively. The health of these persons is often feeble.

9. A *melancholic* temperament is sometimes spoken of. It is nearly allied to the bilious, and is marked by peculiar calmness and seriousness of mind, with great tenacity of impressions, and a tendency to indulge in gloomy thoughts.

10. Pure specimens of these temperaments are rarely met with. In the great majority of individuals two, or even more, temperaments are found in combination, with a marked predominance, however, of one of them. To these combinations the term *mixed* or *compound* temperaments is commonly applied, and compound terms are in use expressive of the union, the predominant temperament being placed first in order. Thus we may have a *nervous-lymphatic*, a *sanguine-nervous*, or a *sanguine-bilious* temperament, the nervous element preponderating in the first, and the sanguine element in the last two cases. In some

instances the leading characteristics of the two temperaments are so distinct, that we have no difficulty in recognising the union, but in a larger number of cases they are so blended that it is difficult to say which temperament predominates. It is also by no means unusual to encounter in the purest specimens of the several temperaments remarkable exceptions to the rule; as, for instance, a pulse of 50 in a youth with all the outward characters of the sanguine temperament.

11. Each of these temperaments is liable to a different class of diseases,—the sanguine, to acute inflammation and active hæmorrhage; the phlegmatic, to congestions and subacute inflammation, to glandular and tubercular diseases; the bilious, to disorders of the digestive organs, to hypochondriasis and melancholia; and the nervous, to disorders of the nervous system, and to mental derangement accompanied by excitement.

12. Among the peculiarities of form and appearance here enumerated as combining to constitute the temperaments, there are some which claim a greater share of attention as indications of natural strength or weakness, and of liability to particular classes or characters of disease. Thus, *cæteris paribus*, the large chest is an indication of vigour; the small chest, of weakness; the thin lip, marked features, and small joints, of tone; the full upper lip, rounded form and features, and large joints, of constitutional debility.

13. There are also particular combinations generally met with in certain diseases or classes of disease, which combinations have received the name of *Diathesis*. For instance, a fair complexion, fine hair of different shades from light to dark chesnut, a blue or gray eye, long eyelashes, with a thick upper lip, is a combination very frequently met with in persons affected with scrofulous diseases; and the same combination, the thin upper lip being substituted for the thick, is as commonly met with in consumptive patients. The former may be termed the *strumous* or *scrofulous*, and the latter, the *phthisical* or *consumptive* diathesis. They are very closely allied, and are probably but very slight modifications of one and the same diathesis.

14. The term *diathesis* is also in frequent use to designate the kind or character of constitution of persons in whom the urine habitually or frequently deposits certain substances. Thus we have the terms *oxalic acid*, *lithic acid*, and *phosphatic diathesis*, applied to persons whose urine yields oxalate of lime, lithic acid and its salts, and phosphoric acid and its salts, in excess, accompanied by certain peculiarities of system and departures from health.

15. These external differences which, under the names of temperament and diathesis, distinguish one man from another, are transmitted from parent to child, are recognisable at a very early age, and are the outward indications of a large class of constitutional peculiarities, bodily and mental, traceable to *Hereditary Predisposition*.

16. The extent to which hereditary predispositions are likely to prevail may be inferred from the resemblance which most persons bear to their parents or ancestors. Sometimes the resemblance extends to the reproduction of the very temperament or diathesis of one or other of the parents, coupled with a close resemblance of form and feature; but in the majority of instances, the resemblance is less exact, and is limited to some strongly-marked feature, to some deformity, or to some peculiarity of taste, temper, or talent, which may even be transmitted through several generations. The marked resemblance to each other of the members of the several royal families of Europe is a common subject of remark. The mildness and humanity of the Gracchi, the severity of the Catos, and the cruelty of the Claudian race; the factious rashness of the Guises, the irritable and unbending character of the family of Mirabeau, and the vigorous intellect of our own Gregorys, Herschels, and Pitts, are examples in point. The transmission of supernumerary toes and fingers is a familiar instance of hereditary deformity.

17. Hereditary predispositions to certain diseases are also of very common occurrence. The morbid tendencies which are most frequently handed down from father to son are those to scrofulous affections, pulmonary consumption, gout, insanity, and asthma; stone, gravel, and hæmorrhoids may also be mentioned among the diseases traceable to hereditary predisposition. On the other hand, a sound constitution, and a frame destined to last till a very advanced age, are blessings often handed down through several generations.

18. In extreme cases of hereditary predisposition, all or several of the children of a marriage have become subject, at or about the same age, to a particular infirmity, such as blindness, or have fallen victims to some fatal disorder, such as pulmonary consumption.

19. Hereditary diseases, as distinguished from hereditary tendencies to disease, are of comparatively rare occurrence. A very small number of children, for instance, are born with tubercles in the lungs. The occurrence of syphilis in infants whose mothers, at the time of birth, laboured under that disease, must not be regarded as an exception to this rule, as in this case the disease is not, strictly speaking, hereditary, but communicated by contact.

20. A curious but well-ascertained phenomenon, connected with the subject of hereditary predisposition, is the disappearance of a peculiarity of form, character, or morbid tendency during one generation, to appear again in the next. This has been distinguished by the term *Atavism.*

21. Besides the hereditary diseases or predispositions just referred to, which may be transmitted from parent to offspring without any fault or imprudence on the part of the former, children are often born into the world of infirm constitution and prone to disease, in consequence of circumstances referable to the marriage of the parents.

Marriages contracted too early or too late in life, or between parties too nearly allied in blood, or presenting great disparity of age, are open to this objection.

22. The habitual state of health of the parents, or even their state of health at the time of conception, and that of the mother during pregnancy, may also determine the future constitution of the offspring.

23. An important practical inference may be drawn from what has been now stated concerning temperaments, diatheses, and hereditary predispositions—namely, that we must expect to encounter at the bedside a vast variety of constitutions, and many different degrees of vigour, and that our treatment of disease must necessarily be influenced by our knowledge of those differences. For this reason, too, it is certainly advantageous to a patient to be treated by a medical man already acquainted with his constitution; but this advantage is often estimated much too highly, and can never compensate for even a very moderate superiority in skill or experience.

24. Temperament, diathesis, and hereditary predisposition, then, constitute the most marked and prevailing differences between man and man; but there are other differences of more rare occurrence, and limited to comparatively few individuals, which are known by the name of *Idiosyncrasies.*

25. There are three kinds of idiosyncrasies. The first consists in an extreme susceptibility, or the reverse, to the action of certain medicines, as of mercury. Some persons, for instance, are salivated by a single small dose of the mildest mercurial preparation, while others will resist a long-continued course of the same remedy in its strongest forms. The second kind of idiosyncrasy consists in the production of severe and almost poisonous effects by the most common articles of diet. Fish, fruit, vegetables, and meat, usually accounted perfectly wholesome, create in such persons marked disorder of the digestive organs, accompanied sometimes with painful cutaneous eruptions. The third class of idiosyncrasies consists in the inversion of the characteristic effects of medicines. Thus, instances have occurred in which opium has acted as an aperient; and common Epsom salts as a narcotic. A class of mental idiosyncrasies might be added, consisting in strange preferences or aversions for objects usually deemed indifferent.

26. Besides the differences arising from temperament, hereditary predisposition, and idiosyncrasy, which differences may exist between males or females of the same age, other and very important differences depend upon sex and age.

27. *Sex.*—The constitution of the male differs materially from that of the female, and this difference is strongly marked in the diseases to which each sex is liable, irrespective of those which attack the organs

of generation, or spring out of the peculiar functions which the sexes have to perform. In the constitution of the male there is more tone, more strength, more rigidity, and, as a natural consequence, a greater proneness to inflammatory affections and active hæmorrhages; females, on the other hand, have more sensibility and excitability, and a more lax and delicate fibre, with a strong tendency to nervous affections and to diseases of an asthenic character. The sexual functions of menstruation, parturition, and lactation, and their cessation, also exercise a very marked influence upon the health of the female, especially in the production of nervous disorders.

28. The diseases to which males are subject are, taken one with another, of a more fatal character than those which attack females. Hence the lower rate of mortality and higher longevity of females, and the excess of women among the living population. Were it not for the deaths in childbed, and fatal diseases of the generative organs of females, their rate of mortality would be still less, and the disproportion in the number of the two sexes still greater.

29. The most important practical considerations connected with sex are, the greater liability of males to inflammatory and sthenic diseases, and of females to asthenic and nervous disorders. These considerations must exercise an important influence upon treatment; for, as a general rule, if a male and female are attacked by the same disease, the former will bear depletion and other antiphlogistic remedies better than the latter.

30. *Age.*—There are several important practical considerations connected with age. In infants the gradual, and often imperfect, establishment of the function of respiration, and the consequent necessity of external warmth; in early childhood the disturbance produced by teething, and the liability to disorders of the stomach and bowels, on the one hand, and of the brain, on the other (which bear an obvious relation to the disproportionate size of the abdomen and head), and the activity which characterises the functions of digestion and assimilation, and the opening faculties of the mind, are familiar to all medical men. Diarrhœa, tabes mesenterica, intestinal worms, and scrofulous affections of the absorbent glands, are the diseases resulting from the activity of the organs of digestion and assimilation; and convulsions and hydrocephalus from the large development and vascular condition of the brain. Pneumonia completes the list of the more frequent and fatal diseases of infancy and childhood.

31. The disproportion in the size of the head and abdomen gradually disappears from infancy to childhood, and from childhood to youth. During the latter period, accordingly, the liability to the diseases just named diminishes, and in their place others of a less fatal tendency make their appearance. The disorders of the alimentary canal are not only less frequent and less fatal, but they re-act less severely upon

the brain and nervous system. Intestinal irritation ends less frequently in marasmus and hydrocephalus, and the involuntary movements of chorea take the place of the more formidable convulsions of infancy. These involuntary movements are of more frequent occurrence in females than in males, and the former continue liable to them up to a later period of life. They acknowledge as their most common cause the same intestinal irritation which often gives rise to the convulsions of infancy. Another class of diseases of common occurrence in childhood is that of the exanthematous fevers, to which persons of tender age are peculiarly liable.

32. Towards the period of puberty, the disproportion between the head and abdomen and the rest of the body has almost disappeared, and by the twenty-first year the growth is nearly complete, no material alteration in the external appearance of the body taking place, though the process of ossification is not yet finished. The twenty-fourth, or, according to Quetelet, the twenty-seventh year, is the period at which the body attains its full growth. In the male, the interval between puberty and this period is marked by a considerable immunity from the diseases of the first periods. Disorders of the alimentary canal and of the nervous system are of rare occurrence, but idiopathic fever and inflammatory affections are frequent; and scrofula, which had previously shown itself in the form of enlarged glands and tabes mesenterica, now assumes the shape of pulmonary consumption. In the female, in addition to the diseases which attack the male, those which depend on the imperfect establishment or suppression of the menstrual discharge are rife during the first part of this period. Of these, anæmia is the most common; but chorea and epilepsy, melancholia, and instinctive mania, are occasionally to be traced to the same cause.

33. From the twenty-fourth or twenty-seventh to the forty-fifth or fiftieth year, the body remains nearly stationary, with the exception of an increasing disposition to corpulency. During the first part of this period, idiopathic fevers, inflammatory affections, and pulmonary consumption are rife; but towards the fiftieth year, congestion begins to take the place of inflammation, and apoplexy is superadded to the diseases just mentioned. In the female, the interval from thirty-five to fifty is marked by the cessation of the menstrual discharge, and the strange group of nervous affections which often accompanies the change of life.

34. From fifty to sixty years, the body begins to show symptoms of loss of power and sluggishness of function, the prelude to that slow decay of which the progress is indicated by diminished sensibility, impaired memory, muscular weakness, scanty secretions, calculous affections, osseous deposits, organic diseases of the principal viscera, and malignant degenerations.

35. It is important to understand that between persons of the same

sex who have attained the same age there; are very appreciable differences. These differences are best illustrated in the female by the variable time of occurrence of certain constitutional changes, characterised by the appearance or suppression of the menstrual discharge. Observations on a very extended scale have shown that while the most usual age for the first appearance of the menses is the fifteenth year, that event may happen at any age from eight years to twenty-five. In very rare instances it has occurred earlier than the eighth year, and even in the very first year of life. So also with the period of suppression of that discharge. It may disappear at any age from thirty-five years, or even earlier, to fifty-six years, or later. This is adduced as an illustration of a fact important in practice, that the same age in different persons does not represent the same degree of growth, or the same perfection of function.

36. Another very important consideration in regard to age relates to the fatality of the same disease at different periods of life. As age advances, the structures of the body undergo changes which render them more and more prone to disease, at the same time that they lose the power which they possess in so great a degree in early life, of self-restoration. Hence the great simplicity of the diseases of childhood, and the success attendant upon their treatment, when compared with those of more advanced periods of life.

37. The fact now stated is well illustrated by the mortality of fever at different ages. It is well known that fever is a disease which, in by far the majority of cases, proves fatal, by setting up inflammation in some of the more important organs of the body, as the lungs, the bowels, or the brain. The mortality from fever may therefore be expected to keep pace with, and to be a measure of, the liability of the several organs of the body to fall into a state of disease, and to increase as the power of self-restoration diminishes. Calculations founded by Mr. Finlaison, on the experience of the London Fever Hospital, yield the following important results. If we suppose 100,000 patients to be attacked with fever, at each of the ages specified in the following table, the mortality will be represented by the figures in the column of deaths.

Age.	Deaths.
5 to 16	8,266
15 to 26	11,494
25 to 36	17,071
35 to 46	21,960
45 to 56	30,493
55 to 66	40,708
66 and upwards	44,643

From this table it would appear that the risk to life from fever increases very rapidly with age. Thus, it is more than twice as great at 30 as at 10; nearly twice as great at 40 as at 20, and at 60 as at

40; it is nearly five times as great at 60 as at 10; and nearly four times as great above 65 as at 20. Similar results have been obtained for the febrile exanthemata, which, like fever, originally affect the whole body, but in their progress attack individual organs.

38. The liability to sickness, and the duration of it when it occurs, also increase with age. This will appear from the following table, which is altered from a valuable abstract, by Mr. Neison, of the results of an extensive series of returns from English and Scotch Benefit Societies.

Age.	Per Centage of Members Sick during each Year.	Sickness per Annum among those actually Sick, expressed in Weeks.	Mortality per Cent. among those actually Sick.
11—15	21·9	4·1	1·0
21—25	22·0	3·8	3·1
31—35	21·0	4·4	3·8
41—45	23·0	5·9	4·5
51—55	27·6	8·5	6·2
61—65	35·6	15·2	8·6
71—75	58·4	32·3	12·1
81—85	74·5	37·8	18·4

39. The individual differences just pointed out—temperament, diathesis, hereditary predisposition, sex, and age—are still further extended and exaggerated by climate, place of abode, habit and mode of life, and the almost innumerable influences which, especially in civilized life, are brought to bear upon human beings at every period of their existence. Some of these influences will require especial notice, in consequence of their bearing on practice.

40. The most powerful of these influences is the atmosphere, which not only affects the entire surface of the body by variations in its temperature, pressure, and hygrometric and electric condition, but, by its contact with the skin and internal surface of the lungs, produces the most important and extensive chemical changes in the blood, and through it in the system at large. A variety of subtle poisons, of which some are eliminated from inorganic matter, others generated by animal and vegetable decomposition, and a third class given off from diseased living bodies, are also held in suspension in the air. All of these, in a state of concentration, may give rise to fatal accidents, or to severe diseases; but when diffused in smaller quantity through the air, they modify the state of health, and impair the tone of the system. Other substances—such as smoke, dust, and metallic particles, diffused through the atmosphere during certain chemical or mechanical opera-

tions—also tend to impair the function of the skin and lungs, and may become the source of fatal maladies.

41. The temperature, moisture, pressure, and electric condition of the air, variously modified and blended, constitute *climate*, of which the prolonged effect upon the frame is seen in the form and features of the body, as well as in the condition of its several functions. Some of these conditions of the atmosphere are deserving of separate notice, as having a marked influence upon health.

42. Of these conditions of the atmosphere, the *temperature* is by far the most important; for it results from actual observation on the large scale that the amount of sickness among a population increases as the temperature rises, while the mortality is greatest when the temperature falls to the lowest point. A hot summer is therefore very sickly, and a cold winter very fatal to life. The less mortal sicknesses of summer prevail in the shape of diarrhœa, European cholera, dysentery, and febrile affections, among the young and middle-aged; the more mortal maladies of winter in that of fatal pneumonia and bronchitis among infants and aged persons. As one marked effect of a high temperature is to promote the process of putrefaction and decay, it is obviously favourable to diseases dependent upon atmospheric impurity. This circumstance accounts for the fact, that in former times, when our towns were in a much more filthy state than they are even now, sickness and mortality were both at their height in summer; and one result of the improved sanitary state of our crowded populations is to shift the maximum mortality from the summer to the winter months.

43. The influence of *moisture* is not so readily traced by means of numerical data as that of temperature. It is well known, however, that excessive humidity of the air generally coexists with a high temperature in climates and regions most fatal to life, as on the southern coast of Africa, and the Sunderbunds of Bengal. There is also good ground for believing that the inhabitants of damp soils and low-lying districts have less vigour than those who inhabit gravelly and sandy soils, and the summits of hills and mountains. Experience also proves that most invalids, and especially those who are prone to gout, to urinary disorders, to evanescent eruptions on the skin, to indigestion, and to chronic affections of the air-passages, suffer most, and are most liable to the recurrence of their several complaints, when the air is loaded with moisture.

44. *Atmospheric pressure* also has its effect upon the health, and many invalids are susceptible even of slight changes in this respect. The oppression experienced in the diving-bell, the diarrhœa incident to those who remove to residences in very lofty situations, and the hurried respiration, quickened circulation, and tendency to hæmorrhage which accompany the ascent of high mountains, are illustrations of the more extreme effects of increased or diminished atmospheric pressure.

45. The influence on health of the *electric condition* of the air has

not yet been clearly made out. The very small quantity of electricity which has more than once been detected in the atmosphere of places in which the Asiatic cholera was raging, is one of the most remarkable coincidences yet pointed out.

46. The contamination of the air by noxious gases and particles of smoke and dust, is a most efficient cause of modifications in the state of health, as well as a prolific source of disease. The pure air of rural districts is subject to contamination by the exhalations from stagnant pools and marshes, which, when they do not produce actual disease, have a morbid influence on the general health of the inhabitants. But the air of large towns is subject to still greater pollution by the gases given off from the body itself, the decomposition of animal and vegetable substances, the refuse of manufactories, the smoke resulting from the imperfect combustion of fuel, and the dust created by constant traffic.

47. These impurities in the air of large towns, existing both within and without the dwellings of their inhabitants, tend to modify the state of health of those who are reputed healthy, and to render them liable to a class of diseases distinguished from those of rural districts by an absence of power or tone, no less than by the different and even opposite treatment which they require. Thus a disease, which in the country will bear and require bloodletting, will, in large towns, scarcely admit of any amount of depletion, and may even demand an opposite mode of treatment. This depressing and debilitating effect of the atmosphere of large towns, displayed in the pallid aspect of those who are esteemed healthy, and in the want of power accompanying the diseases to which they are subject, is a fact of great practical importance, and one which ought always to be borne in mind at the bed-side.

48. The debilitating effect of a residence in large towns is most remarkably shown in that class of the inhabitants which follows its employments within doors, and which, in addition to the impure air of the town itself, is exposed to the close and heated atmosphere of shops and workshops. These persons exhibit, in an exaggerated form, the peculiar influence of a town life, and their diseases are marked in a still greater degree by want of power. There is as much difference between the in-door and out-door labourers of large towns as there is between the inhabitants of the town and of the country. A difference of a less marked kind is also to be observed between those who lead a sedentary life within doors, and those whose in-door employments require a greater amount of exertion. A residence in large towns, then, tends to reduce the strength and vigour of the frame, and predisposes to diseases characterised by want of tone and power; and this effect is more marked in persons employed within doors than in those working in the open air, and in the sedentary than in those using greater exertion.

49. In the case of many of the inhabitants of large towns who fol-

low in-door employments, another depressing and exhausting influence is often superadded to those just enumerated, viz., long hours of work or service, often extending far into the night, and sometimes usurping almost all the time which ought to be devoted to sleep. The London bakers, during the whole of the year, and milliners and dressmakers, during the fashionable season, suffer greatly from this cause.

50. The injurious effects of the polluted atmosphere of large towns may be inferred from the excessive mortality of their inhabitants as compared with that of rural districts. Thus, while the annual mortality of rural districts in England and Wales generally falls short of 2 per cent, or 1 in 50, that of town districts, not being the seats of manufacture, will often amount to 2½ per cent., or 1 in 40; and that of populous manufacturing towns and crowded sea-ports to 3⅓ per cent., or even more. The mortality in some continental capitals exceeds 4 per cent., or 1 in 25. The very highest of these rates of mortality is exceeded in certain unhealthy districts of almost all our large towns.

51. But when the necessary element of the age of the living population is taken into account, these marked differences in the longevity of the inhabitants of town and country, and of the best and worst districts of the same town, are brought within much narrower limits.

52. It must not, indeed, be supposed that the rural districts enjoy an absolute immunity from the causes of disease which impair the vigour and shorten the lives of the inhabitants of towns. Defective drainage and natural obstacles to the free movement of the external air often combine with overcrowding and neglect of cleanliness within doors, and a scanty and unwholesome diet, to counteract the beneficial influence of wholesome labour in the pure open air of the country, and so impair the strength as to predispose to diseases of the low type prevalent in crowded city populations. Over-work, also, is not an evil limited to town populations.

53. The diseases which cause this high mortality of town populations are, in accordance with what has been just stated, the scrofulous affections of children, and the pulmonary consumption of the adult, together with febrile diseases and exanthemata, characterised by an unusual tendency to the typhoid or adynamic form. The dust and smoke suspended in the air of large towns also give rise to diseases in the lungs, which exist in their most severe and fatal form among the knife-grinders of Sheffield.

54. Next to impurity of air, as a cause of diminished health and vigour, comes scanty or unwholesome food. An insufficiency of nourishment is one of the most influential causes of that want of power and tone which have been pointed out as marking the inhabitants of large towns, and of some of the least favoured of our rural districts. In infancy and childhood, again, a diet not merely unequal to the wants of the frame, but unsuitable to the age, or destitute of some essential element of the growth of the body, often sows the seeds of future weak-

ness and disease. At all ages, too, the poorer part of our population are peculiarly exposed to the danger of unwholesome food, or are forced by sheer destitution to live on a diet wanting in the requisite variety of elements. Hence land scurvy and other allied diseases.

55. A still more fatal cause of debility and disease is the abuse of spirituous liquors, to which the inhabitants of large towns are peculiarly addicted. Its effect on health is seen in the pallid and sodden aspect of the drunkard; its influence on the character and course of disease in the fatal effects so often attending the slightest injuries in the brewer's draymen and others addicted to habits of intemperance; and its agency in shortening life by facts which it may be well to state somewhat in detail.

56. It has been ascertained that in men peculiarly exposed to the temptation of drinking, the mortality before thirty-five years of age is twice as great as in men following similar occupations, but less liable to fall into this fatal habit. It has also been shown that the rate of mortality among persons addicted to intemperance is more than three times as great as among the population at large. At the earlier periods of life the disproportion is still greater, being five times as great between 20 and 30 years of age, and four times as great between 30 and 50. The annual destruction of life among persons of decidedly intemperate habits has been estimated at upwards of 3,000 males and nearly 700 females, in a population of nearly 54,000 males and upwards of 11,000 females addicted to intemperance. The greater number of these deaths are due to delirium tremens and diseases of the brain, and to dropsical affections supervening on disease of the liver and kidneys.

57. This extensive prevalence of intemperance among the English population should be borne in mind, especially as no fact is better established than that diseases occurring in constitutions which have been impaired by excess require a peculiar treatment. Intemperate persons not only bear depletion worse than other inhabitants of large towns, but they even require the opposite mode of treatment.

58. Luxury, too, like intemperance, tends to undermine health and shorten life. Hence the higher orders, as has been recently shown, are short-lived, and, we may therefore safely infer, unhealthy while they live. Our agricultural labourers, in spite of the many disadvantages to which they are exposed, are much longer lived than any of the higher classes; and the aristocracy are nearly on a par with the members of benefit societies in Liverpool, the unhealthiest city in England. Of the classes, too, which enjoy the most ample means of self-indulgence, those are the most unhealthy which possess these means to the greatest extent. Thus the gentry are more healthy than the aristocracy; the aristocracy, than the members of royal houses; and these last more healthy than crowned heads. Those who occupy the highest place in the social scale are probably, in point of health

and longevity, but little raised above the very meanest of their subjects.

59 The general result of the foregoing considerations respecting health, and the differences which exist between one individual and another, may be thus summed up:—There are many original and many acquired differences between man and man. The original differences are those conveyed by the terms temperament, diathesis, hereditary predisposition, and idiosyncrasy; to which we may add those dependent upon sex and age. The acquired differences are due to climate, place of abode, employment, diet, and mode of life. In speaking of age, it is also important to understand that the same age does not imply the same degree of growth or development; and that even those functions which would seem to be most important to the health and vigour of the frame, present a wide latitude in the time of their appearance and disappearance.

60. When, therefore, we take into consideration the original and acquired differences which distinguish man from man, and the various and complicated influences to which the body is exposed in all states of society, but especially in highly-civilized communities, no additional argument will be necessary to establish the first great principle on which much of the practice of medicine hinges—*that in health, and (by natural inference) in disease, every function of the body varies within wide limits of intensity.* This fact is the key to the imperfection of medicine as a science and its difficulty as an art.

61. DISEASE.—To define disease we must first have defined health, for the one is but the negation of the other. In like manner, the description and right understanding of disease depends upon the description and right understanding of health. Without attempting a formal definition of disease, it will be sufficient to state, that disease is present when any structure of the body is changed (provided that change be not the direct and immediate effect of external injury), or when any function is either unnaturally active, or torpid, or altered in character. As we cannot say that any structure is changed, unless we know what that structure was in health, nor that any function is disordered, without a previous knowledge of the natural condition of that function, it is obvious that an accurate acquaintance with structural anatomy and physiology is a necessary preliminary to the study of disease. We learn the healthy structure of the body by dissection, the healthy condition of the functions by observation. On this latter point our information is extremely imperfect, and many difficulties lie in the way of our obtaining it; nor is its importance yet fully recognised.

62. Diseases vary much (*a*) in their mode of occurrence; (*b*) in the causes which produce them; (*c*) in their duration and course; (*d*) in their type or form; and (*e*) in their nature. The following are some of the terms corresponding to these differences:—

63. (*a*) *Epidemic.*—Attacking a number of persons in the same place at the same time, and recurring at irregular intervals; as fever, small-pox, cholera, &c.

Endemic.—Peculiar to certain localities, as ague, goitre, &c. The same disease may be both epidemic and endemic: thus, typhus fever, which is endemic in certain districts of large towns, is epidemic in those districts in certain seasons or years; cholera again is endemic in India and epidemic in Europe.

Sporadic.—Attacking one individual at a time. In this sense the term is sometimes applied to epidemic and endemic diseases when they attack one or two persons only, in which case they are said to occur *sporadically*.

Zymotic.—From a Greek word signifying ferment, is now used to characterise the entire class of epidemic, endemic, and contagious diseases. The term is objectionable, as involving a theory of disease, but convenient as grouping together diseases which are allied by the similarity of their predisposing causes.

64. (*b*) *Contagious and Infectious.*—These terms are now used synonymously to designate diseases communicated from one person to another.

Hereditary.—Transmitted from parent or ancestor to offspring or descendant.

65. (*c*) *Acute.*—Of short duration and great severity.

Chronic.—Of long duration and slight severity.

These may be combined, as in intermittent fever, which is *chronic* in duration and *acute* in severity. Again, one may run into the other, the acute subsiding into the chronic, and the chronic being heightened into the acute. In one instance, the terms *acute* and *chronic* have been incorrectly used to mark merely the severity of disease; thus articular rheumatism or rheumatic fever is called *acute* rheumatism, and rheumatism of the muscles is called *chronic* rheumatism.

66. (*d*) *Continued.*—Running their course without interruption in their symptoms.

Intermittent or Periodical.—Interrupted by intervals of health.

Remittent.—Having an alternate augmentation and diminution of their symptoms.

67. (*e*) *Structural.*—Consisting in some alteration of structure.

Functional.—Consisting in disordered function.

Common.—Presenting the more usual characters of common inflammation, &c.

Specific.—Peculiar, or departing from the common character. Thus, syphilis and scrofula are specific diseases.

Malignant.—Structural diseases for which no remedy has yet been discovered, and which spread from texture to texture, as cancer.

68. *Names of Diseases.* (Medical nomenclature.)—No uniform plan has hitherto been pursued in giving names to diseases. By far the greater number have been named from some prominent symptom, as fever (from *ferveo*, to burn), hydrophobia, diabetes. Other diseases have been named from their seat and nature combined, as hydrocephalus, water on the brain. The nature of a large class of these diseases is indicated by the termination of the words themselves, as pericarditis, pleuritis, iritis, inflammation of the pericardium, of the pleura, of the iris, the first part of the word indicating the part affected, and the termination *itis* denoting the nature of the disease, viz., inflammation. Recent attempts have also been made to substitute for words in common use more philosophical terms descriptive of the nature of the existing disease. Thus it has been proposed to substitute the term hyperæmia (excess of blood), qualified by the words general, local, active, passive, &c., for plethora, inflammation, and congestion; and anæmia (defect of blood), similarly qualified, for chlorosis, &c. To many of these innovations it may be objected that it is yet premature to use words which imply an accurate knowledge of morbid conditions, and that for some time to come it will be better to continue the use of those terms with which the profession is most familiar.

69. *Classification of Diseases.* (Nosology.)—The same objection applies to all philosophical systems of nosology which lies against innovations in the use of terms; namely, that we are not yet prepared to construct a philosophical system. Almost all the systems hitherto proposed have rested upon some theory, which is now disallowed, and they have been attended with the usual inconvenience of all hasty and premature generalization—the inconvenience of associating dissimilar things, and separating those which are closely and naturally allied. Culler's Nosology illustrates this inconvenience in almost every page. The arrangement adopted in the present work is such as to bring the diseases of the same parts together, whereby the student and practitioner will have the advantage of comparing and contrasting one with another.

70. There are some considerations connected with disease in general which are of far higher importance than the use of terms, or the adoption of a correct nomenclature and classification. These will be treated of under the following heads:—(*a*) Causes; (*b*) Symptoms and Signs; (*c*) Diagnosis; (*d*) Prognosis; and (*e*) Treatment.

71. (*a*) *Causes of disease.* (Etiology.)—Many verbal distinctions are in use in respect of the causes of disease, but the division most generally recognized is, into *proximate* and *remote.*

Proximate Causes (Causæ abditæ, continentes, occult causes).—This term has arisen out of the twofold meaning of the word disease. If a disease happen to be named from the part which it attacks, and the nature of the change that part is undergoing, as pericarditis, or inflammation of the pericardium, the proximate cause is the disease itself; if, on the other hand, the name is but the representative of a group of symptoms, as cough, dyspnœa, hectic fever, emaciation, &c.—the symptoms of phthisis—then the term proximate cause means the suppurating tubercle which gives rise to all these symptoms. But if we are ignorant of the seat of a disease, as is the case with fever, the search after a proximate cause is but an inquiry into the real nature of the disease.

Remote Causes. (Causæ evidentes).—All constant antecedents of an event are called *causes* of that event, and all constant consequences of an event are called *effects* of that event. Hence the same thing may have many causes. Thus an hereditary taint, intemperance, or want, and a common cold, may exist in the same person as causes of pulmonary consumption. The hereditary taint may have rendered the person more liable than others to the formation of tubercles, intemperance or want may have occasioned their actual deposition and the cold may have excited the dormant tubercle into activity Now all these are *causes* of consumption, and the consumption may become the cause of death. How then are such causes to be distinguished from each other? They are divided into *predisposing* and *exciting*. In this instance, the *predisposing* causes are the hereditary taint, and the mode of life; the *exciting* cause is the cold, and the *proximate* cause (if the term must be used) the suppurating lung.

The condition of the body itself, however it may be brought about, is the *predisposing cause*, or the reverse, of any disease which may befall it; the *exciting causes* are external agents of various kinds, as cold, heat, &c. These external agents are also among the most powerful *predisposing* causes. Thus that combination of external influences which we call climate is the predisposing cause of a great variety of diseases, and any one of the elements of which it consists may become an exciting cause.

72. (*b*) *Symptoms and Signs of Disease.* (Symptomatology, semeiotics:)—All lesions of structure, whether the consequence of external injury or of internal change, cause some disorder in the functions of the body, and almost every disorder of one function leads to derangement in those which are most closely connected with it. These disordered functions are called *symptoms.* Thus pain, cough, and difficulty of breathing are symptoms. Groups of symptoms, also, if they have a name, become compound symptoms. Thus fever is a symptom of inflammation.

73. The term symptom is variously qualified in medical writings. Thus we have *anamnestic* symptoms, or those which relate to a patient's previous state of health; *diagnostic*, or those which distinguish his disease from others; *prognostic*, or such as enable us to predict the event of his disease; *pathognomonic*, or those which are peculiar to his malady, and to that alone; and *therapeutic*, or such as indicate the treatment to be adopted.

74. But we have also *signs* of disease, and the word *sign* has not precisely the same meaning as the word symptom, though the two terms are sometimes used without much discrimination. The difference between them will be best shown by an example. Cough, expectoration, dyspnœa, hectic fever, night-sweats, and emaciation are *symptoms* of pulmonary consumption, but they are not *signs*, for each of them may occur in other diseases; but cavernous respiration and pectoriloquy are signs. So also expectoration is not a *sign* of consumption but a symptom, for it occurs in many other diseases of the chest; but a certain kind of sputa is stated to be a *sign* of that disease. From this it would appear that *signs* are merely pathognomonic or diagnostic symptoms. There is, indeed, nearly the same difference between a symptom and a sign as between a character and a characteristic. Redness, pain, increased heat, and swelling are symptoms or characters, or phenomena of inflammation; but redness and increased heat are at the same time symptoms and signs, characters and characteristics; pain and swelling are merely symptoms.

75. The term *physical* sign is in common use among medical men: it means a sign which is an object of sense. Thus, heat, redness, and swelling are physical signs of inflammation, pectoriloquy of phthisis, coagulable urine of disease of the kidney.

76. The first duty of the physician is the interpretation of symptoms: this he effects by careful examination. If, for instance, a patient complain of pain in the chest, he proceeds to ascertain whether that pain is external or internal, and if internal, what is its precise seat. If, again, a patient void urine different from that of health, he submits it to chemical tests, or he examines it under the microscope, that he may find out the exact nature of the change which it has undergone, and trace that change to its source. By thus weighing the value of every symptom, he learns what the disease is, what its severity, what the treatment to be adopted, what the hope of recovery. His success will greatly depend on the method of examination which he adopts. Some of the more important methods are described in a future chapter.

77. In the observation of disease, the physician should be prepared to encounter one great difficulty, viz., the variation of the same symptom in different cases, and the occasional absence even of those symptoms which when present are most characteristic. Thus, a frequent pulse is among the most striking symptoms of consumption, but cases sometimes occur in which the pulse does not exceed its average number in health. In these cases, it is true the number of beats may be really greater than it was in the same person in sound health, but by our ignorance of that number we lose the benefit of the symptom. This same symptom of increased frequency of pulse is among the most constant and characteristic attendants on fever, and yet in some epidemics the pulse has been unusually infrequent. These anomalies meet the physician at every turn.

78. (*c*) *Diagnosis*, or the discrimination of diseases, is the necessary prelude to the treatment of disease. It is the first duty which the physician has to perform at the bedside, and everything depends on the way in which he discharges it. A correct observation and just appreciation of symptoms are essential to a true diagnosis. Diagnosis, indeed, may be said to be the art of converting *symptoms* into *signs*.

79. The first impression which the patient makes on the physician is always an important element in the diagnosis; in most cases it enables him to determine whether he is suffering from a slight or a severe illness, and, in many instances, to decide at once upon the nature of the complaint. Thus, anæmia, pulmonary consumption, pneumonia, emphysema, Bright's disease, fever, and severe diseases of the heart, are often so strongly marked on the very countenance of the patient, as to leave no doubt in the mind of the experienced physician; and many other diseases, such as chorea, gout, and rheumatic fever, several of the exanthemata, and skin diseases in general, betray themselves by single symptoms which are decisive of their nature. The diagnosis in such instances is very simple; but the task of the physician becomes one of considerable difficulty when the disease is either imperfectly developed, as in the first stage of eruptive fevers, and in incipient phthisis, or when the only obvious symptom is one which may depend on several causes, as is the case with dropsy; and it is still more difficult when the nature of the complaint must be inferred chiefly from the description which the patient gives of his own sensations, or from a mere perception of the size and shape of a part of which the structure is concealed from view, as happens with the greater number of tumours. These are the cases which put the knowledge and skill of the physician to the test, and which sometimes baffle both.

80. In some instances it may be necessary to wait till the characteristic symptoms show themselves; in others, to make minute examinations by means of the stethoscope; in others, to apply chemical tests to the urine, or to call in the aid of the microscope; and in a few, to confess our ignorance. The effects of remedies, such as bloodletting and stimulants, will also in rare instances serve as means of diagnosis. The symptoms which render us the greatest assistance in distinguishing one disease from another will be carefully examined in a future chapter.

81. (*d*) *Prognosis*. The meaning of this term is foreknowledge, and, as used by the physician, it means the anticipation of the course and event of diseases. The power of foretelling the progress and termination of a malady is of the first importance, not only as regards the treatment to be adopted, but as respects the comfort and well-being of the patient and his friends, and the reputation of the physician himself. A correct prognosis implies a just diagnosis, an accurate knowledge of the natural course and progress of disease, an appreciation of all the peculiarities, original and acquired, which distinguish one man from another (see pp. 1–14), and experience of the power and

mode of operation of remedies. It must be obvious from this statement that the art of prognosis is one of unusual difficulty, and that it ought, for the sake both of the physician and his patient, to be exercised with discretion and caution.

82. This subject is too extensive to be fully treated in this place, but it may be well to point out and illustrate one or two of the leading questions which the physician may be called upon to solve. One of the most frequent questions is, whether the disease admits of cure? The answer is sometimes very easy. A case of hydrophobia, on the one hand, or of hysteria, on the other, presents no difficulty. The one is as certainly fatal as the other is curable. But in a case of tetanus, of pneumonia, or of pulmonary consumption, the prognosis offers greater difficulty. The first would be most probably fatal; the second is always attended with danger, the amount of which will chiefly depend upon the sex, age, temperament, and previous habits of the patient; the third is fatal in a very large majority of cases, and the probability of ultimate and complete recovery is very slight.

83. This latter disease—pulmonary consumption—offers a very good example of the necessity of caution in forming and stating our prognosis. Pulmonary consumption is incurable, and medicine, at best, is but palliative; but if in every case of pulmonary consumption a physician were to foretel a fatal result, his reputation would suffer severely, for the simple reason that consumption, though ultimately fatal, in nine hundred and ninety-nine cases out of a thousand, is not necessarily fatal in any given attack, recoveries even from several successive attacks being by no means unusual; and this happens, not because the disease is curable, but because its fatality depends upon the extent of tubercular deposit. This fact forms the true explanation of the asserted efficacy of medicines and change of climate in this disease.

84. This is the place to speak of that *vis medicatrix naturæ* which our predecessors were wont to acknowledge with such befitting modesty as their invaluable coadjutor in the treatment of disease; but which our own presumption leads us so often to overlook or undervalue. In thus withholding from nature the tribute which is her due, we are as unwise as we are unjust. It is the obvious interest of the regular practitioner of the healing art to extol the powers of nature, and to attribute to them a large share of the success so commonly ascribed to his own treatment. It is only in this way that the public can be rescued from the grasp of empiricism. The homœopathist attributes to infinitesimal doses virtues which are simply ridiculous, and results which are utterly impossible; but the regular practitioner is constantly called upon to explain certain cures alleged to have been effected by this preposterous agency. The *vis medicatrix naturæ*, the power which is inherent in the human frame to right itself when suffering under severe disorders—a power which, as too often happens, having been long counteracted by the administration of active medi-

cines, is restored to freedom by that expectant treatment which is the essence of homœopathy—this power is the real agent in the restoration to health under the hands of a race of quacks whose treatment in most cases is in itself harmless. There are other forms of quackery, and certain quack medicines, which are far from being harmless when carelessly administered, but which are of real service in certain instances. The public is informed of these successful cases, the unsuccessful or the fatal ones are, for obvious reasons, unknown. The case of pulmonary consumption, alluded to in the last paragraph, goes far to complete the explanation of the success of quackery in the several forms and guises it assumes. The alleged efficacy of climate in cases of pulmonary consumption is an apt illustration of the occasional identity of the mistakes made by the regular and irregular practitioners of medicine.

85. If the foregoing observations be well founded, it must follow that to determine whether a patient's recovery from disease has happened in consequence of the treatment adopted, or independent of it, or in spite of it, is one of the most difficult trials to which a man's judgment can be subjected. The accomplished physician must often err in his decision; the ignorant empiric and the equally ignorant public are utterly unqualified to form an opinion concerning it.

86. (*e*) *Treatment.*—A correct diagnosis, a knowledge of the nature of the disease itself, of the constitution of the sufferer, and of the virtues of remedies, are essential preliminaries to judicious treatment. The object which the physician proposes to himself will vary with each case. In one case, it will suffice to remove the ascertained cause of indisposition; in another, it will be necessary to restore the altered function or diseased structure; in a third, we can merely hope to palliate the suffering which the disease occasions.

87. Our treatment will sometimes be founded on a correct knowledge of the nature of the disease and the mode of operation of our remedy, in which case we are said to pursue a *rational* treatment; in other instances, we act in ignorance of both, and then our treatment is said to be *empirical.* Again, our treatment may be *curative*, that is to say, it may restore the patient to perfect health; or *palliative*, in other words, adapted to the alleviation of suffering; or *preventive*, that is to say, directed to the preservation of health, or to obviate the recurrence of disease.

88. The abstraction of blood in inflammation is an example of *rational* treatment, for we understand both the condition of the part affected and the *modus operandi* of the remedy. The use of quinine or arsenic in ague is merely *empirical*, for we understand neither the nature of ague nor the mode in which these medicines affect the body in curing it. The treatment of pulmonary consumption is necessarily *palliative*, for, from the very nature of the complaint, it is obvious

that it does not admit of cure. Such also is the case with a large proportion of neuralgic affections, and with malignant diseases.

89. In the treatment of many diseases we combine the rational with the empirical, and the curative with the palliative; thus, during an attack of remittent fever, we sometimes have recourse in turn to bloodletting to subdue local inflammation, to cold-sponging to diminish the heat of the surface, to stimulants to counteract existing debility, and to quinine to effect a cure of the disease.

90. Though the employment of remedies, the precise *modus operandi* of which we do not understand, constitutes what is usually designated as *empirical* treatment, the act of generalisation, by which we infer the utility of the same remedies in other analogous disorders, lends to our empiricism something of a rational character. For example, though the employment of quinine and arsenic in ague was originally pure empiricism, the use of those remedies, as the consequence of analogical reasoning, in the whole class of intermittent disorders, deserves to be characterised by a more complimentary epithet.

91. The considerations brought forward in this chapter will serve to show the extreme difficulty which attends the practice of medicine, and the necessity imposed on the physician of supplying himself with very extensive and precise information on all the subjects which can conduce to a knowledge of the human body, on the one hand, or of the virtues of remedies, on the other. But, after all that can be done, the science of medicine must remain extremely imperfect, and the art extremely difficult. Our general principles, derived originally from particulars made up of many variable elements, must be re-applied in practice to individual instances as complicated as those out of which they were originally formed, so that precision is, in the nature ot things, impossible, and certainty of very rare attainment.

92. Other considerations, which go far to explain the acknowledged difficulty of medicine, both as a subject of scientific inquiry and of practical application, are the variable severity of diseases bearing the same name, the changes which occur in the progress both of acute and chronic cases, and the variable strength of the remedies we administer. When we reflect that prior to the setting in of any given disease, the constitution of the patient, originally marked by peculiarities traceable to hereditary predisposition has been subsequently modified by the powerful influences already examined; that the disease itself may vary within wide limits of intensity; that it passes naturally through many different phases; that it may fall under observation and treatment at any part of its course; that the remedies prescribed, being of variable strength, may be administered with more or less care and regularity, and the patient be tended with greater or less watchfulness and skill: when we take all these circumstances into consideration, we cannot be surprised that medicine should be an imperfect and uncertain science, a conjectural and difficult art.

CHAPTER II.

PHYSIOLOGY AND GENERAL PATHOLOGY.

93. THE human body may be considered as a machine, not less remarkable for the finished workmanship of its parts and the consummate skill with which they are put together, than for its complexity. In these respects it resembles, at the same time that it infinitely surpasses, the most perfect work of men's hands; but it stands alone in this, that it contains within itself the means of ministering to its own growth and preservation, and, within certain limits, of repairing the many injuries to which it is exposed.

94. A framework for locomotion and for the protection of its more important organs; a nervous system with the brain and spinal marrow as its centres of sensation, volition, and thought; a digestive apparatus for the assimilation of its food; organs of circulation for distributing throughout the body the nutritious liquid blended with the pre-existing blood; viscera for the constant purification of the blood as constantly undergoing contamination from the decomposition of the effete textures of the frame; and a nervous net-work bringing the important internal organs of the economy into effective and harmonious action—such are the chief constituent parts of this machine.

95. The intimate connexion which exists between the several parts of the frame, and the close dependence of one function upon another, are even more remarkable than the multiplicity of the parts themselves, and the variety of functions which they perform. If the heart ceased to circulate blood, or the lungs to purify it, the nervous system would no longer send forth those influences by which the heart beats, and the chest breathes. If, on the other hand, the nervous centres suffer severe injury, respiration is impeded or prevented, and the heart soon ceases to beat. External influences also, on whatever part of the frame they act, affect not that part only, but through it other organs, and through these the entire body. Again, the mind affects the body, and the body reacts upon the mind, and both together form a being so intricate in structure, and so complex in function, that the continuance of its life and the maintenance of its health appear a constant miracle. But the perfection of this machine is equal to its intricacy; and thus it happens, that while the one provides under favourable circumstances for the free play of all its parts, the other exposes it under unfavourable ones to serious derangements of function and alterations of structure.

96. The brief outline just given of the constituent parts of the human frame will serve to indicate the contents of the present chapter, which are as follows:—

i. The physiology and general pathology of the fluids, including digestion, chylification, sanguification, and excretion.

ii. The physiology and general pathology of the circulating organs, considered as instruments for the distribution of the blood.

iii. Structural physiology and pathology.

iv. The physiology and general pathology of the nervous system.

v. The mind; considered more especially in its relation to the body.

I. PHYSIOLOGY AND GENERAL PATHOLOGY OF THE FLUIDS.

97. The functions of digestion and assimilation, or the conversion of the food successively into chyme and chyle; the composition and leading properties of the blood and its constituent parts; and the functions of the lungs, skin, kidneys, and liver, with the nature and composition of their secretions, are the subjects which fall to be considered under this head.

98. *Digestion.*—It is now generally understood and admitted that waste of material is a condition of vital action; so that the slightest movement of the body, the most evanescent thought, the most transient exertion of the will, is accompanied by a loss of substance, which loss of substance is due to the death of certain particles of the organ concerned in the vital action. The consequence of this *death* of the minute constituent parts of the frame is that they fall under the control of chemical laws, are resolved into compounds unfitted to support life, and must be removed from the body by one or other of the excreting organs. The sum of the daily waste of the several parts of the body, therefore, is determined by the sum of its daily actions and exertions mental and bodily; and this waste must be supplied by food.

99. In an adult, arrived at his full growth, in perfect health and vigour, and using no undue exertion of mind or body, the daily waste is repaired by the daily food, and the weight of the body undergoes little or no change from day to day. But there are many ways in which this nice balance of waste and supply may be destroyed. It may be destroyed by increased exertion without a proportionate increase of food; or by a still greater amount of exertion, the appetite remaining good, and the supply of food unlimited; or by increased exertion with diminished supply of food, as in training for the turf; or, lastly, with great rapidity, by entire abstinence from food, as in shipwreck and famine. In all these cases the weight of the body is diminished. On the other hand, in healthy persons, with unimpaired digestion, the body gains weight either by inactivity, or within certain limits, by increase in the quantity of food.

100. In certain diseases, again, waste goes on with extreme rapidity; as in fever, when rapid destruction of the textures is combined with a complete loss of the appetite for food; in pulmonary consumption, when, the appetite remaining, as it often will, unimpaired, the local waste, added to profuse sweats or discharges from the bowels, exceeds the powers of assimilation; in diabetes, where the mal-assimilation of the food renders the repair of even a moderate loss of substance impossible; during exhausting discharges, which drain the body of its blood; and in some local diseases or injuries, attended by rapid loss of substance in the part affected—a loss which the most nourishing diet is unequal to repair.

101. During the period of growth, food is required not merely to supply the waste which is going on through the destruction of parts, but to furnish the new materials required by the frame. Hence the large consumption of food which takes place in childhood and youth in proportion to the dimensions of the frame.

102. One use of food, therefore, is to supply the waste of substance which is constantly going on; but the recent researches and reasonings of Liebig have shown that this is not the only service rendered by the food we eat. A considerable portion of it would appear to be constantly employed for the production of animal heat, by which the temperature of the body is maintained. Hence the quantity and quality of the food which it may be expedient or necessary for a man to take will depend upon the two distinct considerations of its use as a repairer of waste, and as a means of supporting the temperature of the body. For the first purpose the food must contain those elements which abound in the structure of the body itself; for the last, a large supply of carbon is especially requisite.

103. There is still one other form of waste which it may be well to specify—a waste of water. During strong exertion, and under exposure to a high temperature, but especially when the two are combined, water is profusely discharged from the lungs and skin, and must be restored to the blood by the free use of liquids. There are also certain diseases accompanied by a large and rapid outpouring of fluid, and which equally demand the free use of liquids. The most remarkable of these diseases are Asiatic cholera and diabetes, in the first of which the fluid is thrown out from the mucous membrane of the alimentary canal, and in the last by the secreting apparatus of the kidney.

104. The sensations of *hunger* and *thirst* are the appointed means by which we are warned of this twofold waste of the solids and fluids of the body, and by which we are invited to repair it. In healthy persons, leading temperate lives, the intensity of these sensations bears a just relation to the wants of the frame; but there are some diseases in which the indications afforded by these sensations are fallacious, and there are modes of life which tend to blunt them, or to render them unduly acute.

105. A sensation of hunger altogether disproportioned to the true wants of the frame is not of uncommon occurrence. It is present in certain nervous and mental disorders, and in many persons who lead an indolent and inactive life; and in rare cases which bear a close resemblance to spectral illusions and other violent excitements of the organs of sense, it reaches that point of intensity which is characterised as *bulimia*. The appetite, again, may be unduly stimulated by the abuse of condiments, and by the arts of a refined cookery. On the other hand, the appetite may be destroyed or greatly impaired by the use of opium, tobacco, and spirituous liquors in excess, by strong and sudden emotion, and by intense mental application. It is also impaired or destroyed in the great majority of diseases, especially in inflammatory and febrile disorders.

106. Again, the sensation of hunger, though under ordinary circumstances a measure of the wants of the frame, sometimes deceives us as to the capacity of the frame to make a profitable use of the food supplied to it. In the early stages of tabes mesenterica, for instance, the body wastes in consequence of the obstruction offered to the passage of the chyle into the blood; but the stomach remaining sound the appetite bears a due relation to the wants of the frame, and is often voracious. It is not till the more advanced stage of the disease, when hectic fever sets in, that the appetite fails and the digestion becomes impaired.

107. The same observations which apply to the sensation of hunger hold good in respect of thirst. There are many ways in which it may become disproportioned to the wants of the frame. A hot and stimulating diet, salt meats, wine or spirituous liquors in excess, excite this deceptive sensation of thirst. There is also a diseased condition, the analogue of bulimia, known as *polydipsia*.

108. Intense thirst also characterises the operation of the class of irritant poisons. Whether this symptom is to be regarded as a false sensation due to active inflammation in the back part of the throat and fauces, to which parts the sensation of thirst is referred, or whether it is to be looked upon as an indication of the pressing necessity for the dilution of the blood with which the poison has been mixed by absorption, is a question which we are scarcely prepared to answer. If the latter alternative be the true one, it will probably equally serve to explain the intense thirst created by a diet containing an excess of salt.

109. As in a healthy and natural state of the body the appetite serves as an index of the amount of food required to repair the waste of the frame and to support the process of combustion going on in the lungs, so, in certain diseased conditions, does the utter failure of the appetite serve to point out the expediency of a total abstinence from food. This is especially the case during fever and inflammation, when, all the secretions being suppressed, the gastric juice is no longer formed,

and digestion is rendered impossible. Indifference to food is sometimes heightened into a positive loathing, or *nausea*, which is among the most common symptoms of disease.

110. But though the sensations of hunger and thirst, in a healthy person, and under ordinary circumstances, may be regarded as accurate indications of the wants of the frame in respect of solid and liquid food, these indications are by no means so exact as to supersede the influence of habit. On the contrary, daily experience proves that a considerable latitude in the quantity of food taken and in the number of our meals is perfectly compatible with sound health. Nature does not prescribe in a manner not to be mistaken either the quantity or the time.

111. Nor is the quality of the food best adapted to the wants of our frames indicated with such precision as to preclude the use of a diet varying greatly in different climates and among different races of mankind; for though the formation of the teeth is held to prove that man was destined to partake both of animal and vegetable food, experience proves that a diet consisting exclusively, or almost exclusively, of the one or the other is consistent with perfect health and great strength.

112. There is one period of life, however, at which the diet best suited to the nourishment of the frame is indicated in a manner not to be misunderstood, both by the absence of the means of mastication and by the actual supply of the food itself; namely, the period of infancy. The substitution at this important period of a diet differing materially in its constitution from that supplied by nature is often attended by fatal results. To this cause, in fact, though not exclusively, may be attributed the high mortality of the inmates of foundling hospitals during the first year of life, and of the children of the working class in infancy and early childhood.

113. The first step in the process of digestion is chiefly mechanical. It consists in the division and trituration of the solid portions of food by the teeth, the moistening of them by the saliva, and their propulsion into the stomach. The conditions essential to the perfect performance of this first part of the process of digestion are, therefore, the soundness of the teeth, the careful performance of mastication, and the secretion of a sufficient quantity of saliva. Of these, that which is under the control of the will—mastication, is often very insufficiently performed, either from habit, or from preoccupation of the mind in the pursuit of absorbing studies or the hurry of business. A train of dyspeptic symptoms owes its origin to this cause.

114. The food masticated and moistened by the saliva, being received into the stomach in successive morsels, excites the muscular coat to contraction, and stimulates the vessels of the stomach to the secretion of the gastric juice. As each morsel of food arrives in the stomach, the organ contracts so as to blend it with that already received into it,

and relaxes again, after an interval of a few seconds, to receive the next morsel. When the meal is finished, a periodic peristaltic action of the transverse fibres sets in, commencing at the cardiac orifice, and extending through the entire organ, with greatly increased force and rapidity in the part nearest the pylorus. After ceasing for a short interval, it recommences, and so continues till the digestion of the meal is complete. The effect of this peristaltic action, as shown by Dr. Brinton, is to cause a circulation of the food in two currents, the one revolving externally from the cardiac orifice towards the pylorus, the other returning internally from the pylorus along the axis of the organ. In this way the several portions of the food become mixed, and exposed equally to the action of the gastric juice. During the intervals of contraction it would appear that the pylorus relaxes slightly, so as to allow a small portion of chyme to pass into the duodenum.

115. The gastric juice, which, it is important to bear in mind, is only secreted under the stimulus of the food itself, is a clear, transparent fluid, without odour, slightly salt and perceptibly acid, the acidity being probably due to free lactic acid. It also contains a peculiar principle called *pepsin.*

116. The gastric juice has the property of rapidly disintegrating and dissolving food, and of checking putrefaction. It is poured out with great rapidity, in quantity proportioned to the food to be digested, unless that quantity should happen to exceed the real wants of the frame and the indications of the healthy appetite, in which case a portion of the food remains undigested, and by undergoing putrefaction generates carbonic acid and other gases. The action of the gastric juice is promoted by the warmth of the body.

117. When the food taken into the stomach is of a solid or pulpy consistence, the gastric juice begins to act upon it almost immediately; but when liquids are taken in excess with the food, they are removed from the stomach by absorption before the process of digestion can take place. This fact has an important practical bearing.

118. The time required for the complete digestion of the food varies in different persons, and in the same person at different times, and under different circumstances. The chief causes which affect the duration of the process, irrespective of the state of the body and of the stomach and its secretions, are, the quantity, quality, and degree of division of the food itself, and the quantity of the saliva and of the liquid with which it is mixed.

119. The states of body and mind most favourable to digestion are repose and cheerfulness: strong exercise of the body and anxiety or preoccupation of mind impair the power of the stomach. Too short or too long intervals between meals are also injurious; the one by overtasking, the other by wearying the organ. Strong alcoholic liquors are, as a general rule, eminently injurious; but when

judiciously administered in small quantity, they, in common with condiments, may facilitate digestion.

120. The gastric juice acts out of the body almost as well as in the stomach, provided it be kept at the temperature of the organ and in motion. When the temperature is much lowered its power is greatly impaired, and when raised to 115° or 120° of Fahrenheit its power is destroyed and cannot be restored. An artificial digestive fluid may be made by soaking the fresh mucous membrane of the stomach of an animal in dilute muriatic or acetic acid. This fluid, at a temperature of 99° to 100° Fahrenheit, converts food into a substance closely resembling chyme.

121. A long series of observations was made by Dr. Beaumont on the person of Alexis St. Martin (who, in consequence of a musket shot in the left side, had a fistulous opening communicating with the stomach), with a view of determining the time occupied in the digestion of different kinds of food. The conclusions at which he arrived are not free from objection, and have received some important corrections at the hands of M. Londe, who enjoyed a similar opportunity of observation through a fistulous opening communicating with the small intestines. The more important conclusions arrived at by these observers, and which have been confirmed by other authorities who possessed similar opportunities, may be briefly stated as follows:—1. Animal food is more completely digested in the stomach than vegetable food, but is retained longer, vegetable food leaving the stomach with its texture only partially destroyed and very perceptible. 2. When animal and vegetable food are taken together the vegetable portion of the food leaves the stomach first. 3. Animal food appeases hunger more completely than vegetable food, and is also more stimulating. 4. The more cohesive the food the longer does it remain in the stomach, and *vice versâ*. 5. The more nutritive the food the longer does it continue in the stomach. 6. When the wants of the system are not urgent the digestion of those vegetable substances which are most difficult of assimilation does not begin till they arrive at the ileum, though fully exposed to the action of the gastric, biliary, and pancreatic, fluids. When, however, the wants of the system are urgent, the digestion of these substances takes place much more promptly. 7. Fatty and oily substances are most difficult of digestion. 8. As a general rule, boiled meats are more easy of digestion than roasted, and roasted than broiled.

122. The *chyme*, or the substance which results from the action of the gastric juice upon the food, is by no means uniform in colour, consistence, or composition, but varies in all these respects with every change of diet. This fact is in strict conformity with the results established by recent experiments, which have demonstrated that all the leading constituents of the food are differently acted upon by the gastric juice. Woody fibre, husks of fruit and grain, horn, hair, &c., are not at all digestible; albumen is dissolved and so changed in com-

position that it is no longer coagulated by heat; fibrin and coagulated casein are dissolved and partially converted into albumen; gluten is so changed as to lose its property of gelatinizing; sugar of milk becomes converted into lactic acid, and starch into sugar. Fat and oil pass out of the stomach unchanged, and are reserved for the action of the pancreatic juice.

123. Several attempts have been made to simplify our views of digestion, and of the multitudinous ingredients of which our food consists, by reducing the constituents of that food to two or three leading elements or classes of elementary principles. According to Dr. Prout, all food, whether animal or vegetable, may be resolved into four classes or groups of staminal principles—the *aqueous* (water), the *saccharine* (sugar, vinegar, starch, gum, &c.), the *albuminous* (the proximate principles of animals, and vegetable gluten), and the *oleaginous* (oils and fats). Neither of these principles taken alone will support life, and no substance which constitutes the food of the more perfect animals consists of less than three, if not of four of them. Milk, the nourishment provided by nature for the young of animals, is a compound of all these principles.

124. A more simple classification consists in dividing the several organic constituents or elements into the *nitrogenous* and the *non-nitrogenous*; the first class comprising the protein compounds, albumen, fibrin, casein, gelatine, &c.; the second, animal sugars and fats, lactic and acetic acid, &c.

125. The discovery by Mulder of *protein*, of which albumen, fibrin, and casein are merely modifications, and the further discovery that these three substances, so nearly identical in composition and properties, are constituents both of animal and vegetable matters, has tended still further to simplify our views of the process of nutrition.

126. *Protein* (from the Greek verb πρωτεύω, to be first) may be obtained from albumen, fibrin, or casein, by dissolving them in a moderately-strong solution of caustic potash, and exposing the solution for some time to a high temperature. On the addition of acetic acid the protein is precipitated as a gelatinous translucent matter. The ultimate analysis of this substance proves it to consist of about 56 parts of carbon, 22 of oxygen, 16 of nitrogen, and 7 of hydrogen, in 100 parts.

Ten parts of protein, with one of phosphorus and two of sulphur, constitute albumen, as found in the serum of the blood.

Ten parts of protein, with one of phosphorus and one of sulphur, constitute fibrin; and

Ten parts of protein, with one of sulphur, constitute casein.

The other proximate organic principles, namely, gelatin, chondrin, elaine, stearine, margarine, hæmatosine, globuline, &c., also consist of the four gaseous elements (nitrogen, carbon, oxygen, and hydrogen), in different proportions, with or without the addition of phosphorus and sulphur.

127. For practical purposes, the views of Dr. Prout on the functions of the stomach and the digestion of the food may be advantageously adopted. He represents the food as undergoing two changes in the stomach, which he characterises as *reduction* and *conversion*. The one consists in the formation of a homogeneous pulp; the other is a chemical action by which the several staminal principles are converted into substances similar to those which enter into the formation of the blood. In the healthy stomach, both these processes are perfectly performed; but in disease they are liable to derangement.

128. The *reducing* power of the stomach may be increased, while the *converting* power is diminished. In these cases large quantities of food are taken, but the body remains thin: the products of digestion pass off by the bowels, or, in rare instances, entering the blood, are discharged unchanged by the urine. On the other hand, the reducing power of the stomach may be diminished, giving rise to various forms of dyspepsia. If the converting power at the same time remain intact, the patient may gain flesh; if it be diminished, he grows thin. The reducing functions of the stomach may be impaired by over-repletion, by the excessive use of liquids, especially those of a stimulating kind, by injudiciously-prolonged abstinence, or by the abuse of condiments.

129. The *converting* power of the stomach may be unusually active, in which case the food is rapidly converted into nourishment; or it may be lost in respect of all the principles, in which case the body ceases to be nourished; or it may extend to one only of those principles, and thus lay the foundation for serious disease. The mal-assimilation of the saccharine and albuminous principles leads to effects both strongly marked and severe.

130. The mal-assimilation of the saccharine principles (sugar and vinegar, starch, lignin, and gum) causes the formation of sugar, which finds its way into the blood and urine in diabetes; of oxalic acid, which, in union with lime, constitutes the oxalate of lime, or mulberry calculus; and of lactic acid, which abounds in rheumatic and hectic fevers, and is probably the chief ingredient in the acid liquors rejected from the stomach in dyspepsia. Mal-assimilation of the albuminous principles (albumen, gelatin, fibrin, and gluten,) may lead to an excess of albumen, conveyed into the blood and eliminated by the kidneys, and to the formation of lithic acid and cystic oxide calculi, the mal-assimilation of the allied gelatinous principles leads to an excess or deficiency of urea, or of its equivalent,—the carbonate of ammonia. The mal-assimilation of the oleaginous principle leads to a deficiency of fat in the frame, or leanness; an unusual power of assimilating this principle to corpulence. It has been already stated that the property of dissolving or reducing the oleaginous principle belongs to the secretion of the pancreas.

131. These forms of mal-assimilation are inferred to exist, not so much from the analysis of substances rejected from the stomach, or contained in it after death (though sugar has been found in the stomach in excess in cases of diabetes), as from discovering the products of such mal-assimilation in the blood and urine.

132. The want of power to assimilate one or other of the staminal principles may often be traced to hereditary predisposition, and to those causes which impair the general power of the stomach.

133. The chyme having passed from the stomach into the duodenum is mixed with the bile and with the secretion of the pancreas. By the latter of these secretions, any oily or fatty matters which the chyme may contain are dissolved.

134. The part which the bile plays in the completion of the digestive process is not so well ascertained. One of its offices would appear to be that of neutralizing a portion of the free acid of the chyme by means of its alkaline constituents. It also acts as a stimulus to the mucous membrane of the intestinal canal, promoting both the secretion of mucus and the natural action of the bowels. Liebig has also proved that the bile subserves the function of respiration, through its principal constituent, the *bilin*, or *choleic acid*, a substance rich in carbon and hydrogen, and having a strong affinity for oxygen. The sugar which has been proved to exist in the blood of the hepatic vein is also, from the large proportion of carbon which it contains, admirably adapted to subserve the process of respiration.

135. The biliary secretion stands alone in being formed from blood which has already served other purposes in the economy—the blood of the vena porta. As this vein derives its supply mainly from the intestinal canal, it suffers distension whenever the coats of the intestines are unusually loaded with blood. Hence the secretion of the bile depends upon the supply of blood from the intestines, and the state of the intestines is, on the other hand, influenced by the quantity and quality of the biliary secretion.

136. The large size of the liver, independently of other considerations, renders it extremely probable that its functions extend far beyond the secretion of a fluid subservient to digestion. This inference is strengthened by the still greater relative size of the liver during fœtal life, when the process of digestion has no existence, as well as by the comparatively small size of the pancreas, to which recent researches have assigned the important function of dissolving the oily and fatty contents of the chyme.

137. That the principal function of the liver is one subservient to the process of respiration is highly probable from its position in relation to the lungs. Considered as a part of the circulation, the portal vein consists of a venous trunk, formed by the union of the entire venous system of the alimentary canal. Of the blood which this

venous trunk conveys to the liver part is used in secreting bile, which finds its way back into the intestinal canal, and part passes on to the heart. If we suppose for a moment that in place of a duct conveying bile into the duodenum, we had a vein opening into that viscus, and constituting a branch of the portal vein, we should have the most efficient of safety valves to guard against the engorgement of the lungs with blood. Discharges of blood, there is reason to believe, do actually occur from the biliary duct in extreme cases of congestion of the liver, whether connected with a similar state of the lungs or independent of it. But it is obvious that an abundant secretion of bile, discharged into the duodenum, and regurgitating into the stomach, or carried forward through the intestines, would answer the same end. This is the probable explanation of certain cases of bilious vomiting and diarrhœa. In cold climates, a sedentary life, giving little play to the lungs, conjoined with indulgence in the pleasures of the table, leads to an increased secretion of bile, part of which passing into the intestines, doubtless tends to prevent congestion of the lungs, and part being absorbed into the blood tinges the conjunctiva, and, in extreme cases, the skin. Strong exercise in the open air, by calling the lungs into activity, and promoting a more thorough combustion of the carbon and hydrogen of the blood, lessens the necessity for the formation of bile, rapidly removes symptoms of indigestion, and restores the natural clearness of the complexion. In hot climates again, the demand upon the lungs for the combustion of the carbon and hydrogen of the blood being diminished, if more nourishment is taken than is required, bile is found in increased quantity. In either case (whether in cold or hot climates), habitual excess in eating and drinking leads to the same result—functional or organic disease of the liver. Another acknowledged cause of liver disease is the abuse of the liquid hydro-carbons—the several forms of spirituous liquor. The excessive evacuations of bile which occur in phthisis pulmonalis and in diseases of the lungs, functional and organic, point to the same use of the liver, as a safety-valve to the circulation through the lungs.

138. But the uses of the liver are not exhausted by these considerations. It is necessary, in order to understand them fully, to trace the bile through the intestines. Now, it appears that, in ordinary circumstances, the quantity of the bile, or of its leading constituents, which is to be found in the fæces, forms only about one thirty-fourth part of the entire secretion. The remainder must be absorbed from the intestines either by the lacteals or by the portal vein; and as it would seem in the highest degree improbable that a secretion once formed by the liver is again taken up and conveyed to it, the most reasonable supposition is, that it is absorbed by the lacteals with the chyle, and poured into the circulation.

139. The function of the fœtal liver is doubtless analogous to that of the adult liver. The bile is secreted, and probably poured into the intestines, as in the adult; that portion of it which is fitted to form a

part of the circulating fluid is absorbed and carried into the venous system; while that portion which in extra-uterine life mixes with the undigested portions of the food and other effete matters, and is discharged from the bowels at short intervals, as fæces, accumulates in the intestines as meconium, and is expelled during delivery, or soon after birth. In intra-uterine, as in extra-uterine life, therefore, it is probable that the liver performs the important office of elaborating a fuel having a strong attraction for oxygen, and, consequently, well adapted to support the function of respiration.

140. Recent experiments, as already stated (§ 134), have shown that sugar—a substance rich in carbon, and, like choleic acid, well adapted to support the process of combustion in the lungs—is formed during the passage of the blood of the vena porta through the liver.

141. The discovery of the true use of the pancreas has thrown light upon a subject upon which little was previously known—malassimilation in the duodenum. The absence of the pancreatic secretion would be accompanied by a loss of the power of dissolving or reducing fatty and oily substances, which would accordingly pass from the bowels unchanged. Fatty stools would, therefore, indicate disease of the pancreas, either putting a stop to its secretion, or preventing the flow of the pancreatic fluid into the bowels.

142. The excrementitious matter, mixed with a small portion of the bile, passes through the intestinal canal, and is discharged as *fæces.* The bile and the indigestible portions of the food form the natural stimulus to the motions of the intestinal canal; an excess of bile increases the peristaltic action, a deficiency of it, as in diminished secretion or obstructed flow of bile, causes constipation. In like manner, an excess of excrementitious, and especially of ill-digested matters, produces diarrhœa; and the absence of all indigestible matter from the food tends to cause constipation. This is one of the evils of an over-refined cookery. The passage of the fæces through the intestines is also greatly promoted by the movements of respiration, and by all exercises by which the abdominal muscles are called into play. Hence the effect of sedentary habits in producing constipation.

143. The fæces form but a small proportion of the entire ingesta, and consequently of the egesta. In Dr. Dalton's experiments, ninety-one ounces of ingesta yielded only five ounces, or about 1-18th part, of fæces. The quantity of this excretion, however, varies greatly in different persons, and in the same person at different times, and has also a close dependence on the quantity of indigestible matter taken with the food.

144. Of the two portions into which the chyme is separated, viz., chyle and excrementitious matter, the chyle is absorbed by the lacteals, and conveyed into the thoracic duct, where it is mingled with the lymph collected from every part of the body by the absorbents. The

mixed fluid is then poured into the left subclavian vein, and becomes a part of the blood. This mixed fluid, in its course through the lacteals, undergoes changes by which the quantity of albumen is greatly increased, and it is approximated more closely to the character of the blood. The absence of these changes is supposed to be one cause of disease, leading in children to obstruction of the mesenteric glands, and, at more advanced periods of life, to the deposit of an imperfect albumen, mixed with fatty or earthy matters, constituting scrofulous matter, tubercle, and gouty concretions.

145. To the changes which the food undergoes from its first reception into the stomach till it is mingled, in the form of chyle, with the blood, Dr. Prout has given the name of *primary assimilation*. The changes which take place in the capillary vessels during the formation of new parts, the conversion of the effete structures of the body into lymph, and those which the lymph itself is presumed to undergo in its passage through the absorbent system, have been called *secondary assimilation*. A few words in reference to this latter process will complete the present outline of the means by which the constant waste of the circulating fluid in secretion and nutrition is repaired.

146. The precise nature of the changes which take place in these minute parts cannot be determined by direct observation, but must be inferred from the composition of the blood, on the one hand, and the composition of the various excretions, on the other. In the formation of the several secretions and structures of the body, many ingredients of the blood, such as fibrin, albumen, salts, &c., must be removed, and the blood itself must be returned to the heart robbed of a portion of its chief constituents. In the destruction of the effete and useless parts of the frame, on the other hand, there is reason to believe that many new principles are formed, which are destined for removal by the excreting organs, and which, if not so removed, act as poisons, and give rise to serious diseases. But the blood may be tainted, not merely by the accumulation of these matters in it, but by the formation of others still more injurious, in consequence of *secondary mal-assimilation*.

147. The principal structures of the body are the albuminous and the gelatinous. The *albuminous* structures which in health are resolved into lithate of ammonia, when mal-assimilated give rise to lithic acid gravel, and perhaps to certain combinations of cyanogen, which act as subtle poisons. During this imperfect assimilation, certain organic diseases of the albuminous tissues are supposed to arise.

148. The *gelatinous* tissues which in health are resolved into lactate of urea, when mal-assimilated, are converted into sugar and urea, or into oxalic acid and urea, the urea being replaced in either case by carbonate of ammonia. The mal-assimilation of these textures also leads to certain diseases of the skin, and to destructive suppuration of the

cellular tissue. The elimination of sugar by the kidneys constitutes diabetes mellitus; and oxalic acid, combining with lime, forms the mulberry calculus.

149. This outline of the processes of primary and secondary assimilation must be received with reserve, as a theory undoubtedly true in some parts, and a fair inference from observation; but in any case as suggestive of useful reflections and important inquiries, and sure to lead, even if only partially true, to practical results, by laying a broad and secure foundation for a sound humoral pathology.

150. The food has now been traced through the processes of digestion, chymification, and chylification, to its commixture with the mass of the circulating fluid. How the milk-white contents of the thoracic duct become converted into red blood, or, to speak more precisely, how the red globules which are superadded to the colourless constituents of the blood are formed out of the materials supplied by the lymph, we are, in a great degree, ignorant. It has, however, been shown that the lymph itself contains lymph-corpuscles differing from the red particles chiefly in colour, and in all probability destined to form the groundwork of them. The next subject for examination is the blood itself.

151. *The Blood.*—This fluid, as it circulates in the vessels is of a very compound character; for it not only contains within itself, as derived from the food, the elements of the several tissues of the body, and consequently the materials for their formation, nourishment, and growth, but also all the new elements into which these tissues are resolved when no longer fit to form a constituent part of the frame.

152. The quantity of blood contained in the adult body is variously estimated at from 8 to upwards of 30 pounds. Valentin estimates it at 34½ pounds for the male, and 26 pounds for the female, when both have attained their maximum weight.

153. The specific gravity of the blood is about 1055. It has been known to reach 1059 in robust men, and to fall as low as 1050 in women. In pregnant women it has been found as low as 1045. It is also of low specific gravity in very young infants.

154. The temperature of the blood is about 100° Fahr.

155. The colour of the blood is bright red in the arteries, and dark red in the veins. It is fluid when circulating within the living textures, but coagulates in from three to seven minutes after its removal from the body.

156. The blood consists of red particles or globules, to which it owes its colour, and of a transparent and colourless fluid, consisting of serum holding fibrin in solution, and which has received the name of *liquor sanguinis*, or *plasma*.

157. The blood when it coagulates separates into two parts, the crassamentum, or clot, and serum. The clot is formed by the coagulated fibrin enveloping the red globules and a portion of the serum: its consistence, therefore, depends upon the relative quantity of these constituents. When the fibrin is large in proportion to the other constituents, the clot is firm; when it contains much serum, it is loose.

158. When, from any cause whatever, the blood is unable to hold the red particles in suspension, and they subside in the fluid more quickly than the coagulation of the fibrin takes place, a yellowish white layer of the plasma, or liquor sanguinis, floats upon the top of the clot, and coagulates, forming the inflammatory or buffy coat. The same explanation applies to the colourless clots which are found in the heart and large vessels after death.

159. The quantity of the *crassamentum* (the combination of the fibrin and red globules, with a variable proportion of the serum) varies within wide limits. The blood of men contains, according to Lecanu, nearly 33 parts more of the chief constituents of the crassamentum—viz., fibrin and red globules—than that of women: in the sanguine temperament they are also more abundant than in the lymphatic.

160. The number of the *red particles* evidently differs in different persons at different times, and it probably varies with age, sex, temperament, and state of health. According to the researches of Becquerel and Rodier, the quantity by weight varies from 113 to 152 parts in a thousand; the average for healthy males being 141 parts, and for healthy females, 127 parts.

161. Each of the red particles of the blood consists of a capsule, and a nucleus, with an interspace supposed to be filled with colouring matter. When the blood is mixed with water the particles swell by imbibition, but if mixed with syrup, or a liquid of greater specific gravity than the blood itself, they are observed to shrink and become puckered from the exudation of their liquid contents. It is probable, therefore, that by swelling when the specific gravity of the blood is reduced, and shrinking when it is increased, the red particles may serve to maintain a more uniform consistence of the circulating fluid.

162. A practical application is made of this effect of fluids of different consistence on the blood corpuscles. When we wish to examine a spot of dried blood under the microscope, in the hope of detecting some of the red particles in their entire state, we employ as our solvent either serum, or a solution of common salt, or a syrup of about the same consistence as the serum of the blood.

163. The capsules and nuclei of the red particles are variously affected by chemical agents. Among those which have the most remarkable effect is the bile, which completely dissolves the blood corpuscle.

164. The proportion of *fibrin* in healthy blood varies from 1½ to 3½ parts in a thousand, the average being 2⅓. It is more abundant in arterial than in venous blood, in about the proportion of 5 to 4.

165. The *serum* is a straw-coloured fluid, holding albumen in solution. On the application of a temperature of 167° Fahr., the albumen coagulates, and separates. This coagulation and separation of the albumen takes place equally when the serum is mixed with other liquids, such as the urine: so that heat becomes a test for the presence of serum in the urine, and a valuable sign of the existence of a certain form of disease of the kidney.

166. The fluid which remains, after the separation of the albumen, is called the serosity. It consists of salivin, casein, lactic acid, and osmazome, with salts (principally of soda) dissolved in water.

167. The quantity of the several constituents of the serum varies in the two sexes, at different ages, and in different temperaments. The quantity of *water* is greater in females than in males; in children and aged persons than in persons of middle age; and in the lymphatic temperament than in the sanguine. In healthy males it has a range of from 760 to 800 parts in a thousand, and an average of 779; and in healthy females, a range of 773 to 813, with an average of 791. The quantity of *albumen* ranges from 62 to 75 parts in a thousand, the average being about 70 parts.

168. In addition to the parts now mentioned, the blood contains, in minute quantity, a variety of principles, which are destined to be removed from the body by the various excreting organs, especially by the kidneys. When these excretions are checked from any cause, the materials which ought to have been removed from the body accumulate in the blood, and may be detected by chemical reagents.

169. The blood is supposed to have an independent principle of life. The best argument in support of this view, is the fact that blood is developed in the ovum previous to the formation of vessels. Whether this be the case or not, the blood exercises a most important influence on the functions of all the organs of the economy, nor can its composition be materially changed without serious consequences to health.

170. The blood undergoes various changes in disease. These consist of—(*a*) Sensible changes; (*b*) Variations in the relative proportions of its constituent parts; (*c*) The admixture of certain substances foreign to its composition in health.

171. (*a*) *Sensible changes.*—The *quantity* of blood is increased in plethora, and of course diminished in cases of hæmorrhage and after long abstinence. It is also said to be diminished in anæmia, but it is probable that the pallor of the surface which characterizes that disease, is occasioned solely by a deficiency of colouring matter. Its *tempera-*

ture is increased in many diseases accompanied by a rapid circulation, as in severe inflammations and inflammatory fevers: on the other hand, it is diminished in languid states of the circulation, and especially in disorders accompanied by imperfect decarbonization of the blood, such as cyanosis. The *colour* of the blood is more florid in diseases characterized by a rapid circulation, as in acute inflammations and inflammatory fevers: on the other hand, in languid states of the circulation, in apnœa, in diseases severely affecting the respiration, in cases where the whole of the blood does not circulate through the lungs (cyanosis), the blood assumes a darker hue. In advanced stages of fever, and in the cholera, the blood is not only of a darker colour, but otherwise materially changed from its usual state.

172. (*b*) *Variations in the relative proportions of its constituent parts in disease.*—The quantity of the *clot* depends upon the degree of contraction of the fibrin, being greater where the fibrin contracts feebly, less where it is strongly contracted. It is also greatly influenced by the shape of the vessel into which the blood is drawn, and by many other causes. The mode in which the blood coagulates is commonly regarded as an indication of disease, and a guide to treatment: as such, it will be considered in the next chapter. The *red particles* are in excess in plethora, and in defect in anæmia. They are more slowly reproduced than the other constituents of the blood, hence the long continuance of pallor after hæmorrhages. The *fibrin* is increased in acute inflammations, especially of the serous membranes, in acute rheumatism, pneumonia, phthisis, erysipelas, cynanche tonsillaris, absorbent inflammation, &c. The greatest increase takes place in acute rheumatism, in which disease it is sometimes nearly three times as great as in health, and continues in excess after repeated bleedings. It is also in excess in the pregnant female. On the other hand the quantity of fibrin is diminished in fevers which are not inflammatory, in cerebral congestions and hæmorrhages, in scurvy, in profuse hæmorrhages, and in inflammation of the mucous membranes. The quantity of the *serum* increases as that of the *clot* diminishes. The quantity of *water* in like manner increases as that of the more solid ingredients decreases. It is in excess in anæmia, and in chronic diseases accompanied with great debility. The quantity of the *albumen* probably bears a near proportion to that of the fibrin: it is greatly diminished in cases of Bright's disease. The *salts* of the serum are unusually small in quantity in typhoid fever, and in cholera morbus.

173. To these facts, which are stated chiefly on the authority of Andral and Gavarret,* the following table of the variation observed in the quantity of the chief constituents of the blood in disease, with the average in health, according to these authorities, may be added.

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* Annales de Chimie et de Physique, Nov. 1840.

Fibrin varies between	10·5	and 0·9 per 1000 parts—average in health	3
Globules . .	185	21	127
Solid matters of serum	114	57	80
Water . .	915	725	790
Inorganic matters of serum . .	8	5	8

174. It is worthy of remark, that those states of system in which fibrin exists in unusually large proportion in the blood, are precisely those in which the cupped and buffed appearance of the blood is most strongly marked, and in which there is the greatest tolerance of the loss of blood. These conditions are acute rheumatism, acute inflammation (especially of the serous membranes), and pregnancy.

175. (c) *Admixture of substances not found in the blood in health.* These are of four kinds:—1. The results of mal-assimilation of the food. 2. The elements of the natural secretions and excretions. 3. Morbid secretions of the blood itself; and 4. Poisons introduced from without.

176.—1. The only substances not naturally contained in any of the secretions or excretions, and which result from mal-assimilation in the stomach, are sugar and oxalic acid; of which the former has been detected in the blood in very considerable quantities, and the latter, though it has not yet been detected, may be presumed to exist in it, as it is found in combination with lime in the urine.

177.—2. The elements of the secretions and excretions accumulated in the blood in consequence either of disease of the proper excreting organs, or of the excessive production of those elements during primary and secondary assimilation, are chiefly the following: urea, fatty matter in excess, colouring matter of the bile, cholesterine, free carbon, and casein.

178.—3. Of the morbid secretions of the blood itself, the chief is pus, which, under certain circumstances, is absorbed from suppurating surfaces, and carried into the circulation.

179.—4. Almost all poisons introduced into the stomach, by wounds, or by the unbroken skin, find their way into the blood, and may be detected there by appropriate tests. Among vegetable substances and products may be mentioned alcohol, hydrocyanic acid, chloroform, camphor, opium, indigo, and rhubarb; among animal substances, musk; among minerals, arsenious acid, barytes, lead, copper, mercury, and silver. To these may be added iodine, ferrocyanate, and nitrate of potass, &c.

180. The various constituents of the blood are separated from it, and thrown out among the textures of the body, or on the surface of membranes, or discharged by its several outlets. Of these fibrin plays an important part in every process of reparation; water and serum are formed in the sacs of the serous membranes, and in the cellular tissue;

the red globules escape in peculiar states of debility; whilst in cases of inflammation, accompanied by loss of substance, a new fluid is formed—viz., pus.

181. The chyle and lymph which are continually added to the blood bring with them many useful and some hurtful principles which must be excreted from the body The organs by which this is effected are the lungs, the skin, the kidneys, and the liver.

182. *Respiration.* The air-tubes after repeated divisions and subdivisions, terminate in minute vesicular cells, which have no communication with each other, and upon the walls of which a minute capillary net-work of blood vessels is distributed. The whole extent of the membrane which constitutes these cells, and through which the atmosphere acts upon the blood, has been estimated by Lieberkühn at 1400 square feet; but by Monro at the more moderate figure of 440 square feet, or about thirty times the external surface of the body. The lungs, therefore, constitute one vast excreting surface, from which is constantly escaping into the air a mixed cloud of carbonic acid gas and water, an interchange of carbonic acid gas and oxygen taking place through the membrane of the cells. This elimination of carbonic acid gas and absorption of oxygen are accompanied by the well-known change in the colour of the blood from dark to light red.

183. Viewed as excreting organs, the lungs have this peculiarity, that they require for the due performance of their functions not merely the contact of atmospheric air, but its constant renewal. In order to effect this, the walls of the chest have been made to undergo alternate expansion and contraction, simultaneously with the depression and elevation of the diaphragm. These alternate movements of inspiration and expiration take place on an average, in healthy and well-formed adults, from eighteen to twenty times in a minute.

184. The whole volume of the air in the lungs is not renewed at each inspiration. After ordinary expiration it has been calculated that 108 cubic inches of air remain in the lungs; and it is probable that the quantity subject to change does not exceed 15 cubic inches. At this rate, and supposing the number of respirations to be twenty in the minute, no less than 432,000 cubic inches, or 250 cubic feet, of air will be required to support the function of respiration during twenty-four hours. This, however, is on the supposition that the body remains during the whole of that time in a state of rest. Under ordinary circumstances of alternate rest and exercise, there can be no doubt that this estimate will have to be very greatly increased.

185. From a calculation based on the assumption that 10¼ ounces of carbon are eliminated from the lungs and skin of an adult male in 24 hours, it may be inferred that the quantity of air required to support the functions of the lungs and skin during that time (no portion of air being used more than once), falls very little short of 2000 cubic

feet; so that if a human being were shut up in a perfectly-close apartment, opened only once every 24 hours, he ought to have at least that space allotted to him. On the same principle, a close bedroom occupied during a night of eight hours, ought to have nearly 700 cubic feet of air for each occupant. The space can only be safely curtailed where sufficient ventilation is practised; but the space allotted to each individual during the space of 12 hours, whether by day or night, ought in no case to fall greatly short of 1000 cubic feet, that is to say, a cube 10 feet in each dimension. In buildings for the reception of the sick, this quantity ought to be increased at least one half. In apartments occupied for shorter spaces of time, 75 cubic feet per hour would be a sufficient allowance.

186. The quantity of air drawn into the lungs at each inspiration, has been just taken at 15 cubic inches; but there is no point upon which the results of experiment differ more widely than this. Vierordt has shown that in his own person the quantity varies at different times as the figures 1 : 4·75, the minimum being 11, an average of the maxima 43, and the mean of all his observations 31; and Valentin, by experiments on young adult males, whose respiration was tranquil, or only somewhat quickened, obtained a minimum of 14, a maximum of 95, and a mean of 40 cubic inches. The principal experimenters on respiration give estimates or measurements founded on experiment, from which it appears that the minimum is 12 cubic inches (Goodwyn and Abernethy), and the maximum 40 cubic inches (Turin and Menzies).

187. According to the lowest estimate, the quantity of carbonic acid gas formed in twenty-four hours amounts to 14,930 cubic inches, or 8,534 grains; according to the highest, to 39,600 cubic inches, or 18,612 grains. The mean of the three estimates (Lavoisier and Seguin, Davy, and Allen and Pepys) is nearly 28,736 cubic inches, or 14,985 grains. The quantity of carbon removed from the blood will therefore be, according to the lowest estimate, 2,820 grains, according to the highest, 5,148, and the mean of the three estimates will give 4,273 grains, or nearly 10 ounces avoirdupois.* This estimate falls short by a quarter of an ounce of that given by Dr. Dalton. (§ 213.) Liebig found that an adult taking moderate exercise expires daily from the lungs and skin an average of 13·9 ounces of carbon.

188. Air once respired contains nearly 6 per cent. carbonic acid; but however frequently the same air is breathed, it never contains more than 10 per cent. The respired air is diminished by about $\frac{1}{24}$ of its volume. This decrease is probably owing to the absorption of oxygen. When pure oxygen is breathed, the quantity of carbonic acid given off from the lungs is increased.

189. Dr. Prout's experiments show that the quantity of carbonic

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* See Müller's Physiology, vol. i. p. 308.

acid generated in a given time is greatest between 11 A.M. and 1 P.M., smallest between 8½ P.M. and 3½ A.M. It is therefore less at night than during the day. It is also less in females than males; in young and old than in middle-aged persons. It is increased by repletion and exercise, and lessened by fasting and rest. It is also diminished by depressing passions, by fatigue, by spirituous liquors, tea, or vegetable food, and by the long-continued use of mercury. Carbonic acid is also given off in larger quantity when the barometer is low, and it is greater for low than for high temperatures.

190. Besides carbonic acid, water is exhaled in large quantity from the lungs. In twenty-four hours this quantity amounts, according to the estimates of different authorities, to from 2,880 to 13,704 grains.

191. The chief function of the lungs, then, is to free the blood from carbonic acid and water. The separation of carbonic acid from the blood, and the absorption of oxygen, is necessary to enable that fluid to act as the efficient stimulus to all the functions of the frame, and to minister to its growth and nourishment. The suspension of respiration for a few minutes is fatal to life, and the circulation of blood not purified by respiration exercises an injurious influence on all the organs of the body, but particularly on the nervous system.

192. Some interesting observations by Dr. Macgregor show that the quantity of carbonic acid exhaled from the lungs is greatly increased in the first stage of small-pox, measles, and scarlatina, as well as in various chronic diseases of the skin. As these diseases decline, the quantity gradually returns to its normal condition. Dr. Malcolm has shown that the quantity of carbonic acid gas is diminished in typhus fever.

193. *The Sweat.*—The *Skin* performs functions of great importance in the economy; for it not only separates from the blood substances which would be injurious if retained in it, but also regulates the temperature of the body by the evaporation from its surface. The chief constituents of the cutaneous exhalation are water and carbonic acid. To these may be added nitrogen, ammonia in combination with lactic acid (according to some, with acetic acid), urea, osmazome, and a variety of salts.

194. The quantity of carbon eliminated by the skin in twenty-four hours amounts, according to Dr. Dalton, to a quarter of an ounce, being a very small fraction of that given off from the lungs. Sometimes carbonic acid is exhaled with nitrogen, sometimes nitrogen alone is given off, and at others neither of them is present. The quantity of these gases also varies considerably; but it appears that nitrogen is most abundant after animal food, and carbonic acid after vegetable food. The quantity of these gases is increased by food and by muscular exertion.

195. The total exhalation from the skin amounts, according to the

estimate of Dr. Dalton, to 6¾ ounces in twenty-four hours. The more accurate experiments of Seguin give 7 grains per minute in a male in a state of rest, which would amount in twenty-four hours to little less than 1½ lb. avoirdupois. This quantity is certainly much too high for the entire day, though it is the result of careful experiments made for a short period.

196. The aqueous exhalation is partly mere evaporation, and partly a secretion. The evaporation is affected by common physical agents; the secretion is increased by these and by internal causes, such as excitement of the circulation, provided that that excitement does not rise too high. On the other hand, it is diminished in a state of complete rest.

197. The quantity of the cutaneous exhalation is increased by a dry and warm atmosphere, by air in motion, and by diminished pressure of the atmosphere; it is lessened by moisture, by stillness of the air, and by increased atmospheric pressure.

198. The perspiration is *diminished* when other secretions are greatly increased: thus the skin is dry in diarrhœa, diabetes, cholera, dropsy, &c. The perspiration is also diminished in the cold stage of intermittent and continued fevers, and at the commencement of all febrile affections. In these cases the secretion is deficient, from the small quantity of blood circulating through the vessels of the surface. On the other hand, whenever the quantity of blood is greatly increased, as in acute inflammations, in the hot stage of fever, and in the febrile exanthemata, the same result follows.

199. The secretion from the skin is *increased* in the sweating stage of intermittent fevers; in continued fevers of the less severe kind: in catarrhal and miliary fevers; and in inflammatory affections, when the febrile symptoms are not very severe. In these cases, the quantity of blood sent to the skin is increased, but falls short of that which exists in the hot stage of fever. The secretion is also increased when determination of blood to the skin is combined with debility of the capillaries, as in hectic fever, especially in that which attends phthisis pulmonalis, in puerperal fever, &c. In extreme debility, again, the perspiration is augmented in consequence of the debility of the capillary vessels, though the quantity of blood circulating through those vessels is diminished. Such are the cold sweats, which precede dissolution. The perspiration is also very abundant in acute rheumatism, and in hypertrophy of the heart.

200. The *odour* of the perspiration, which is naturally sour, is heightened in catarrhal, rheumatic, and arthritic diseases, in childbed affections, and in intermittent fevers. In mania and in pulmonary consumption the sweat sometimes has an unusually offensive odour. The acid odour of the secretion is due to the increase of acetic and lactic acids.

201. Sweats are sometimes partial, as in phthisis; sometimes general, as in the sweating stage of fevers. General sweats are commonly preceded by partial ones.

202. The effect of remedies on the secretion of the skin is well known, some acting by diminishing the violence of the circulation when it is too rapid, others by increasing the action of the heart when the circulation is too languid. The passions of the mind also affect the exhalation from the skin, by exciting or depressing the heart's action.

203. *The Urine.*—This secretion subserves the twofold purpose of removing a portion of the liquid and solid matters which have been taken as food, and the greater part of the materials resulting from the disorganization of the tissues. It consists of water, some effete animal matters, as urea and uric acid, certain saline matters, together with certain constituents of the chyle, and various substances which have entered the circulation. In quantity, it amounts to more than half the solid and liquid ingesta.

204. Its most important constituents are water, urea, and uric acid. The latter ingredients consist of the following elements:—

	Nitrogen.	Carbon.	Oxygen.	Hydrogen.
Urea contains	47	20 ..	27 ..	7
Uric acid ,,	31	40 ..	27 ..	2

205. This table shows that urea and uric acid contain a very large proportion (urea nearly fifty per cent.) of nitrogen, and that they are the principal means by which this gas is eliminated from the system. These elements vary much with the quality of the food. They are increased by, animal, and diminished by vegetable, diet. They are almost absent in infants at the breast, and go on increasing towards manhood.

206. The quantity of the urine is increased by the suppression of other secretions, and diminished by their increase. This increase and decrease are most observable when the cutaneous exhalation is affected. As the urine is a secretion which attracts particular attention at the bedside, it will be more minutely examined in the next Chapter.

207. *The Bile.*—This secretion has been not inaptly described as a soapy fluid consisting of a peculiar principle, bilin or choleic acid, in combination with soda. This peculiar principle, which constitutes about nine-tenths of the solid constituents of the secretion, contains in every hundred parts, 64 of carbon, 9 of hydrogen, 3 of nitrogen, and 24 of oxygen. The solid constituents of the bile are dissolved in about nine times their weight of water. The quantity of bile secreted in 24 hours has been estimated at from 17 to 24 ounces. If, in the absence of precise data, we take that quantity at one pint, and sup-

pose it to weigh 9000 grains, it will follow, that as the solid constituents of the bile form one-tenth of the entire secretion, their weight will be about 900 grains. As, again, nine-tenths of the solid constituents of the bile have been shown to consist of bilin or choleic acid, it follows that about 810 grains of this substance are secreted daily. Now 64 parts in 100, or rather more than three-fifths of this, consist of carbon. This will give for the carbon contained in this secretion nearly 520 grains. As the quantity of bile which is daily voided with the fæces is very small, not exceeding about a scruple in weight, it follows that a quantity of carbon exceeding one ounce must find its way into the intestines, be absorbed from their coats and carried into the circulating system, to serve as prepared fuel for the lungs. (§ 138, et seq.) A smaller quantity of hydrogen, amounting to about one-seventh of the quantity of carbon, would have to be similarly disposed of.

208. By the excretions which have now been examined (those of the lungs, skin, kidneys, and liver), the blood is freed from those matters which are either useless or hurtful. These excretions have been examined separately; but it will be useful to consider them collectively, and to show what share each bears in removing from the blood those ingredients which are poured into it from the thoracic duct, the joint product of the chyle and lymph, or, in other words, of the food and effete textures of the frame.

209. For this purpose, the experiments of Dr. Dalton may be employed. An average of fourteen experiments made on successive days in the month of March gave the following result, the urine and fæces being ascertained by weight, and the proportion of the secretion of the skin and lungs by calculation.

The quantity of ingesta amounted to 91 ounces. The egesta were as follows:—

Urine 48½ oz., fæces 5 oz., exhalation from the lungs and skin, 37½ oz.; of which 30¾ oz. by the lungs, and 6¾ oz. by the skin.

Thus it appears that of the whole amount of the ingesta, nearly one-half was excreted by the urine, a third by the lungs, about a thirteenth by the skin, and an eighteenth by the bowels.

210. By far the largest proportion of these excretions, and consequently of the food and drink from which they may be considered as supplied, consists of water. In the whole 91 ounces, the quantity may be estimated at 76 ounces, and the water contained in the several excretions may be thus stated:—

Urine 45¼ oz., fæces 3¾ oz., lungs 20½ oz., skin 6½ oz. Total 76 oz.

Thus it appears, that of the superfluous water contained in the blood, about five-eighths are removed by the kidneys, somewhat more than a fourth by the lungs, rather less than one-twelfth by the skin, and about a twentieth by the bowels.

211. The separation of water from the body is evidently an important use of these excretions, and it is easy to understand how one of these organs may become vicarious of another in this respect. Thus, when the exhalation from the skin is increased by exercise or by any other cause, the urine is diminished; when, on the other hand, as in diabetes, the quantity of the urine is increased, the skin becomes dry and harsh. The functions of the lungs and skin, in like manner, are closely connected. When during exercise the skin is moist, the respiration is free; but if, the skin being dry, the circulation is at the same time excited, the respiration is difficult and frequent: but the moment moisture breaks out upon the skin, the lungs are relieved as by a charm, the respiration becomes natural and easy, and the body is freed from the load which oppressed it. The pedestrian will recognise the truth of this statement.

212. The quantity of water removed by the bowels being comparatively small, has little effect on the other secretions; but if increased by the operation of a purgative, the urine is diminished in quantity, and in violent diarrhœa, and in cholera morbus especially, is often entirely suppressed. The exhalation from the lungs is probably affected by the quantity of the secretions poured out by the other organs; but as that does not admit of measurement, no accurate statements can be made on this point.

213. Next to the water which is thus removed from the system, the most abundant material excreted is carbon. It is eliminated by the different organs in the following proportions:-

Urine ½ oz., fæces ½ oz., lungs 10¼ oz., skin ¼ oz. Total, 11½ oz. A certain proportion of the carbon contained in the fæces is furnished by the bile, a secretion extremely rich in carbon, containing, as it does, about eighty per cent., of it. The rest of the carbon contained in the fæces has never formed a part of the circulating fluid. Hence the blood is purified of its carbon by the lungs, kidneys, skin, and liver. Of these organs, the lungs excrete so much the larger proportion, that no single organ, nor all of them jointly, can supply the place of the lungs, when their functions are much embarrassed.

214. The lungs and skin excrete carbon with oxygen, as carbonic acid; the kidney, with nitrogen and oxygen, and a small proportion of hydrogen, as urea and uric acid; and the liver, with oxygen and hydrogen, but scarcely any nitrogen, as bilin or choleic acid. As the carbon is similarly combined in the secretion from the lungs and skin, it is easily seen how the functions of the skin may become vicarious of those of the lungs. The relief afforded to the lungs during exercise by free perspiration, probably arises in part from the excretion of carbonic acid; and the same may be said of the colliquative sweats in phthisis pulmonalis.

215. The close relation existing between the functions of the liver

and lungs is proved by the frequent coexistence of diseases of those organs; that the one may be vicarious of the other is shown by the large size of the liver in the fœtus, compared with its size in the adult.

216. The essential constituents of the urine (urea and uric acid) contain carbon in considerable quantity. The formation of these substances in excess may therefore depend upon disordered function of the lungs, as well as on mal-assimilation of the food in the primæ viæ.

217. Nitrogen is at one time absorbed, at another time exhaled, by the lungs; it is exhaled by the skin in variable, but probably not in large quantity; it is nearly absent from the bile, but the appropriate organ for its secretion is the kidney. In what degree other excretions may be vicarious of the kidney in this respect is not yet known.

218. The secretions of the skin, kidneys, and liver abound in salts; one of these organs may, therefore, to a certain extent, become vicarious of another in removing these matters from the system. The recent researches of Dr. Lionel Beale also render it probable that, in disease, certain saline substances are accumulated in large quantity in the seat of the disease, at the expense of some secretion of which they form a normal constituent. Chloride of sodium, which was found in excess in the sputa of pneumonia in the stage of hepatization, and absent from the urine, was restored to the urine on the subsidence of the disease.

219. In the similarity of the matters excreted by several organs of the body, we recognise a provision for maintaining the normal constitution of the blood under the less severe functional disorders of those organs. The efforts made by one organ to supply the place of another, probably account for some of the more familiar symptoms of disease. When these efforts are altogether unavailing, the constitution of the blood becomes seriously altered, and life itself is compromised. A careful study of the elements secreted by the several organs cannot fail to contribute much to the right understanding of disease.

220. The following table presents at one view the foregoing results of Dr. Dalton's experiments; the last three lines of the table being a rude approximation:—

	Pulmonary Exhalation.	Cutaneous Exhalation.	Urine.	Fæces.	Total.
Egesta	30¾oz.	6¾oz.	48½oz.	5oz.	91 oz.
Water	20½oz.	6½oz.	45½oz.	3¾oz.	76¼oz.
Solid residue	10¼oz.	¼oz.	3oz.	1¼oz.	14¾oz.
Consisting of substances containing—					
Carbon	10¼oz.	¼oz.	½oz.	½oz.	11½oz.
Nitrogen and other gaseous elements of urea and uric acid, exclusive of carbon			1½oz.	..	1½oz.
Salts, &c.			1 oz.	..	1 oz.
Residue of undigested matters				¾oz.	¾oz.

221. Having now examined the function of digestion; the constitution of the blood, and of the various materials out of which it is formed; the secretions destined to further uses in the economy, and the excretions by which the blood is freed from useless or hurtful matters; it remains to consider the mechanical arrangements by means of which the blood is renewed and purified, and subsequently distributed through the frame; in other words, to examine the functions of absorption, secretion, nutrition, and circulation.

It will be convenient to examine these functions in the following order:—the action of the heart; the motion of the blood in the arteries; the functions of the capillaries, of the veins, and of the absorbents.

2. PHYSIOLOGY AND GENERAL PATHOLOGY OF THE CIRCULATING SYSTEM.

222. *The circulation.*—The heart is the centre of two incomplete circulations: one through the lungs, beginning at the right ventricle, and ending at the left auricle; the other through the body, commencing at the left ventricle, and ending at the right auricle; the two together forming a complete circulation; an uninterrupted stream of blood. A third circuit may be said to consist of the coronary arteries and vein, the former arising from the commencement of the aorta, the latter opening into the right auricle.

223. The parts which compose these three incomplete circulations consist of arteries, veins, and intermediate capillaries, all of which are always, and in all states of the living body, full of blood, though more or less distended as the quantity of the circulating fluid is increased or lessened.

224. *The heart's action.*—The *heart* is the prime source, and chief cause, of the circulation through the blood vessels. Expelling its contents more or less frequently, and more or less forcibly, in different persons, and in the same person at different ages and under different circumstances, the ventricles send out at each contraction the blood which they have received through the auricles from the large venous trunks. The average number of the heart's contractions in a minute may be set down at 70 for an adult male, and 80 for an adult female.

225. The quantity of blood forced into the aorta at each beat of the heart in a healthy adult has been variously estimated at from two ounces to five or six ounces. The total quantity of the blood has been stated very differently by different authors; it is probably about thirty-two pounds (§ 152). Assuming two ounces to be the quantity, and taking the pulse at 70, it is obvious that a given portion of blood could not complete its circulation through the body in

less than three minutes and a half. Müller estimates the time required at from one to two minutes. Volkmann at 34½ seconds in the new-born infant, and 65¾ seconds in the adult male. Positive experiments made by Hering, on the horse, prove that the circulation may be completed in 25 or 30 seconds; and the still more accurate experiments of Mr. Blake on the same animal, show that it is completed in from 12 to 20 seconds. The experiments of the latter gentleman prove that in the dog the circulation may be completed in as little as nine seconds. In the same animal, the time required for a poison to pass from the jugular vein to the lungs, was four seconds; from the jugular vein to the coronary arteries of the heart, seven seconds; from the jugular vein to the carotid artery, from five to seven seconds; and from the aorta to the capillaries, four seconds. The total estimated quantity of blood must, therefore, be too high, and the quantity expelled at each beat of the heart too low; or, what is perhaps as probable, the entire quantity of blood contained within the body is not constantly in the current of the circulation, but remains for a longer or shorter period in the capillary vessels, subserving the functions of secretion and reparation. The observed difference between the velocity of that portion of the stream of blood which is in contact with the internal coat of the vessels, and of that which occupies their central axis, is also another element in the explanation of the difference between calculation and experiment.

226. The force with which the blood is expelled by the left ventricle has been estimated at somewhat more than four pounds.

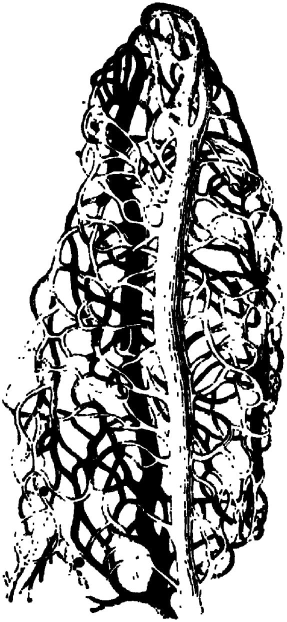
227. *The arteries.*—The blood sent out by the heart is distributed to every part of the body by the arteries. The larger arterial trunks are highly-elastic tubes, destitute of muscular fibre, admitting of expansion both in a transverse and longitudinal direction, and capable of adapting themselves to the volume of their contents. With each contraction of the heart, they are both expanded and slightly curved. That they undergo a positive increase of size has been shown by the ingenious experiments of Poiseuille. In the carotid artery of the horse the increase amounted to $\frac{1}{23}$ of the capacity of the vessel. The larger arteries, by yielding to the impulse of the blood and reacting upon it, cause a delay in its motion which would not occur in the case of rigid tubes; hence the pulse is somewhat later in the arteries remote from the heart, than in those near to it. This same elasticity also equalizes the motion of the blood in the smaller vessels, and causes it to flow in a continued stream. It also accounts for their empty state after death, the blood which they contain being forced into the veins. In old age this elasticity of the arteries is lost by the degeneracy or ossification of their coats.

228. The dilatation of the arteries cannot be seen by the eye, and has been proved to exist only by the use of ingenious instruments. But the large arteries may be seen to throb. To what then is this

throbbing due? To the longitudinal extension of the vessel with each beat of the heart. The vessel, in fact, is stretched and curved outwards by the forcible injection of blood. If now the finger be applied to the vessel with a tolerably firm pressure, this effort at change of place is felt. But this is not all, for the pressure exerted by the finger is resisted by the blood forced into the artery at each beat of the heart, and this resistance is also distinctly felt. These two things together, the change of place which the artery undergoes, and the resistance to pressure offered by the blood injected by the heart, constitute the pulse, and these two elements of the pulse may be recognised by the careful observer. The pulse will be more minutely examined in the next chapter.

229. The smaller arteries which communicate directly with the small veins, or from which the capillaries spring, have been shown by Henle to possess two muscular coats, the inner longitudinal, the outer circular. In certain cases of obstruction to the circulation through the capillaries, these muscular fibres are hypertrophied, and may be very distinctly seen under the microscope. This fact has been clearly established by Dr. George Johnson in the case of the minute arteries of the kidney.[*] The arteries intermediate between the large trunks and their smaller branches, have more or less of muscular fibre in their structure as they approach to the one or the other class of vessels.

Fig. 1.



230. *The capillaries* are the smallest vessels in the body. They form a network, between the meshes of which the proper substance of each organ lies, or they are variously disposed so as to adapt themselves to the form and arrangement of the several tissues; and they establish a communication between the last divisions of the arteries, and the commencement of the veins. The small arteries, which do not lose themselves in veins, have no other termination, and the veins no other origin, but this; and there are no vessels terminating by open mouths. This continuity of the arterial and venous system through the intervention of

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[*] See his paper in the 33rd volume of the *Medico-Chirurgical Transactions*.

the capillary vessels is well shown in the engraving of the small vessels in the interior of the villi of the small intestine (Fig. 1, p. 51), in which the shaded vessels represent the veins, and the vessels in outline the arteries.

231. The capillaries are distinct vessels, with a single membranous coat, and not, as has been sometimes supposed, mere canals drilled in the substance of organs. Through the single coat of these vessels the portion of the blood destined for secretion or nutrition finds its way.

232. The motion of the blood in the capillaries is chiefly dependent on the heart's action; its constant and equable flow on the elasticity of the arterial trunks; and some modifications, at present little understood, on the muscular contractions of the smaller arteries, and on the processes of secretion and nutrition going on in the parts to which the capillaries are distributed. The motion of the blood is less rapid in the capillaries than in the arteries, which may be explained by the great resistance offered by the capillaries themselves; a resistance calculated at from two-thirds to three-fifths of the force of the heart.

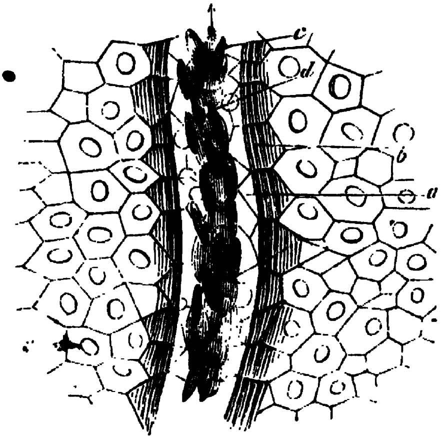
233. The capillaries, as has been stated, are tubes with thin membranous parietes. In health, they subserve the important functions of nutrition and secretion by allowing of the ready exudation through their walls of the materials which the several tissues require for their growth and repair; in disease, they play an important part in those changes which we designate by the terms *inflammation, irritation, congestion*, &c. A knowledge of the real nature of these changes is of the utmost importance to the practitioner.

234. In health we are familiar with some marked changes which the minute arteries and capillary vessels undergo, and these changes will enable us to understand disease. The emotion of shame causes the cheek to blush; the emotion of fear blanches it. Warmth, generally or locally applied, produces redness of the skin; cold, on the other hand, makes the skin pale; exercise, likewise, reddens the surface, and continued rest restores it to its usual colour. Now, the blush of shame, the redness produced by heat, and the glow from exercise—and the pallor produced by fear, by cold, or by continued rest—are all dependent upon changes taking place in the circulation through the small arteries and capillary vessels.

235. There are three distinct ways in which it is conceivable that this increased or diminished redness of the surface, due to changes in the small vessels, may be brought about:—the rapidity of the circulation may be increased or diminished, so that more or fewer red particles (*c*, *d*, Fig. 2) may traverse the vessels (*b*) in the same time; or that portion of the calibre of the vessels which is nearest to their coats (*a*), and which has been shown in tranquil states of circulation to transmit a colourless fluid, may admit the red particles; or the size of

the vessels may be increased or diminished. Observations made on the circulation of the blood in the frog's foot (Fig. 2) have demonstrated the soundness of all these suppositions. The velocity of the circulation is seen to vary; the outer portion of the calibre of the vessels is seen to admit red particles; and the size of the vessels is seen to increase or decrease.

Fig. 2.



236. In the examples just adduced we have three distinct causes of what is called determination of blood to the skin: in the first case, an emotion of the mind; in the second, a local application to the vessels themselves; in the third, the increased action of the heart. From the first example it appears that the state of the small vessels may be changed without any increased action of the heart; for if the enlargement were due to that cause, the blush would not be confined to the cheek; the second shows that local applications will affect them in the same way, without disturbing the heart's action; and the third proves that precisely the same result may follow from the stronger and more frequent contraction of the heart itself. The cases in which paleness of the skin occurs are equally instructive, proving, as they do, the local effect of emotion in producing a change of an opposite kind in the condition of the small vessels, the equally local effect of cold, and the remote effect of a tranquil state of the heart's action.

237. To return to the state of the small arteries and capillary vessels when the colour of the skin is heightened. One change which those minute vessels undergo is that of dilatation. How is that dilatation caused? It has been stated that the small arteries possess a contractile property analogous to that of muscular fibre. There are but two ways, then, in which their enlargement can be explained—viz., the force of the heart's contraction, or the temporary relaxation of the contractile tissue. In the last example adduced, that of the skin becoming red from exercise, the small vessels are obviously dilated by the additional quantity of blood forced into them by the heart; but, in the first two cases, the cause is strictly local, and in no way dependent upon the heart's action. Here, then, we have examples of the small arteries and capillary vessels dilating without any force from behind

to fill them; in the one case, in consequence of an emotion; in the other, of a local application. But this local application itself (heat) is of a nature to expand the substance, whether living or dead, to which it is applied; therefore the effect, in this case, might be regarded in the light of a mere physical change, and not as a proof of any vital expansion of the vessels. This being granted, there would yet remain in the act of blushing an undeniable proof of a *vital* expansion of the small arteries, due to an influence conveyed through the nerves, and operating to produce a momentary diminution or suspension of the contractility of those vessels.

238. As the capillary vessels, properly so called, consist of a single membranous coat, without muscular fibres, it is probable that they are passive in the local changes which occur in the circulation of the blood, and that the rapidity of the circulation through them is determined by the state of the small arteries on the one hand, and the greater or less vigour of the processes of secretion and nutrition on the other.

239. The cells, which are the parts immediately concerned in these processes of secretion and nutrition, are endowed with vital properties which exercise upon the circulation through the capillaries, an influence probably not inferior to the whole *vis a tergo.* That the cells do exert such an influence, is proved by the entire arrest of the circulation through the capillaries of the kidney, as a consequence of the complete destruction of the cells lining the tubes which they supply.*

240. It appears, then, that, in one instance at least, there is no other way of accounting for the enlargement of the minute arteries than by a diminution or momentary suspension of their contractility. Now, in inflammation, this same enlargement of the small arteries occurs; and the important question arises, is it due to the same cause? Take a simple case. A grain of sand gets into the eye, pain is produced, and in a short time the vessels of the conjunctiva become filled with red blood, and obviously enlarged. Here there is no action of the heart to account for the enlargement of the vessels; for the other eye, which is equally affected by the general circulation, is not inflamed. The change, then, is strictly local. It cannot arise from an increased action of the arteries leading to the inflamed part, for any contraction of these arteries must have the effect of diminishing the quantity of blood passing through them to the inflamed part. What, then, can give rise to the dilatation of the small arteries but a temporary loss of their contractility; and what can account for this but an influence transmitted through the nerves to the coats of the vessels? Suppose another case. A piece of ice is applied to a finger. The immediate effect is to contract the vessels; but as soon as the ice is removed, the pale skin becomes red; redder than the surrounding skin. Here, again, the influence of the heart's action in injecting the capillaries is

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* See Dr. George Johnson on the Inflammatory Diseases of the Kidney.—*Medico-Chirurgical Transactions*, vol. xxx.

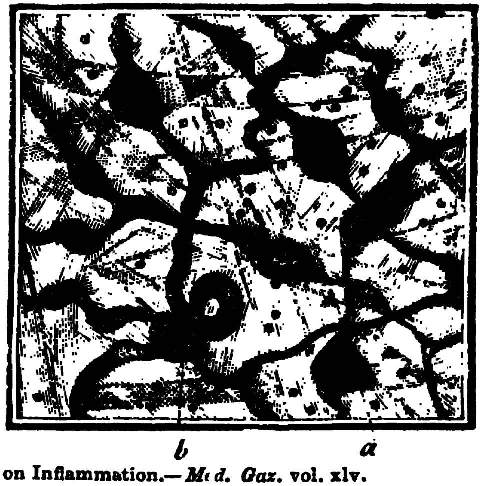
out of the question, and we have a strictly local effect produced, consisting in a contraction of the vessels, followed by dilatation.

241. The contraction of the small vessels, which is here produced by cold, has been shown, by experiments under the microscope, to follow on the application of mechanical and chemical irritants, and of all substances capable of producing inflammation, and to be succeeded, after a variable interval, by dilatation of the vessels. Hence the objection which might be urged against this example, viz., that the contraction is a mere physical effect of cold, loses its force, and the general fact remains, that agents capable of exciting inflammation first act by contracting the small vessels, and that this contraction is followed by dilatation.

242. Can this be explained? Perhaps thus. It is a general law that all stimuli applied to any part of the body call that part into action for a time, and that that action is dependent upon nervous influence; but the nervous influence suffers exhaustion proportioned to its intensity and duration, and that exhaustion produces in the part affected a condition the very reverse of that which existed when the nervous power was in full force. Apply this to the case under consideration, and it will stand thus. The stimulant applied to a part determines the nervous influence to the small vessels of that part, and the function of these vessels—viz., their contractility—is for the time called into full play; exhaustion ensues, and then that same function is paralysed: in other words, the vessels lose their contractility, and yield to the blood which flows into them.

243. Microscopic observations (those of Mr. Paget on the bat's wing are here alluded to as being most satisfactory*) have further shown that during this first period of contraction the flow of the blood is retarded; but that when the vessels become dilated, the circulation is accelerated, to be again retarded after an interval of time. This dilatation of the small vessels is accompanied by an elongation, so that they become tortuous. Here and there, too, they are observed to become varicose. This dilated and varicose

Fig. 3.



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* Lectures on Inflammation.—*Med. Gaz.* vol. xlv.

state of the small vessels, has also been seen by other observers, and is well shown in the annexed engraving by Valentin, after Harting (Fig. 3, p. 55). In consequence of this increase of size, the vessels admit an increased number of red particles; and vessels which previously conveyed only colourless blood, now become carriers of red blood.

244. Such are the changes which take place in the inflamed part; but they are not long confined to the small vessels, for the larger arteries and the veins suffer the same dilatation; and if the inflammation be severe and extensive, the arterial trunks themselves participate; and thus large portions of the body—a hand, a foot, a limb, or an internal organ—become so many congeries of enlarged vessels, which contain a larger quantity of blood than those of the corresponding part of the body. Thus, if severe inflammation attack one hand, it contains much more blood than the other; the radial artery of that side is evidently enlarged; and if a vein of that side be opened, it will pour forth much more blood than the vein of the opposite side.

245. The enlargement of the arteries leading to an inflamed part is due partly to the same cause as the original enlargement of the small arteries themselves—viz., a loss of contractility—and partly to the increased action of the heart.

246. This increased action of the heart sends blood in greater quantity to every part of the frame, and gives rise to *symptomatic fever*. If the nervous system suffer much, it is accompanied with that disturbance of the functions of the brain and nerves which is termed irritation, and we have *constitutional irritation* or *irritative fever*, produced. If the system have been long used to the stimulus of ardent spirits, or if the patient have lived freely, the loss of the accustomed stimulus, added to the increased flow of blood to the vessels of the brain, may give rise to that peculiar state which we call *delirium tremens*. Should the power of the constitution have been previously exhausted, the symptomatic or irritative fever assumes the *typhoid* form in place of the milder form, which it takes in the strong and robust.

247. From what has been said it appears, that in every change which the smaller vessels undergo, the heart or the small vessels themselves are first affected; but that when severe inflammation exists, both are ultimately involved, the heart sending forth more blood, and the small vessels receiving more. In this state, the *heart's action*, which is *muscular contraction*, is increased; the *action of the small arteries*, which is also muscular contraction, is diminished. There is, then, no such thing as increased action of the arteries, in the sense in which that term is commonly used: that which used to be called *increased* action, is, in fact, *diminished* action.

248. The account which has been now given of the condition of the small arteries, veins, and capillaries, and of the circulating system

generally, in inflammation, though, perhaps, sufficient for practical purposes, would lead to error, if adopted as a true and complete *theory of inflammation*. To complete that theory, it is necessary to take into account the organic tissues, to the functions of which the whole system of vessels is subservient—the arteries and veins as carriers of the blood to and from them, and the capillaries as the intermediate and connecting system of vessels through the membranous wall of which the tissues attract the materials of their growth and repair, and the fluid solvent of such portions of them as having served their purpose in the economy, have become effete.

249. The secreting cells which constitute the bulk of these tissues play a very important part in the production of inflammation. In those cases where the inflammation originates in an increased action of the heart, the function of secretion in the part affected is deranged by the turgescence of the vessels. The increased quantity of blood imposes on the secreting cells an amount of duty which they are unable to perform. Hence, the elements of the secretion accumulate in the blood, and the original turgescence of the vessels is increased and perpetuated. On the other hand, in those cases where the first link in the chain of causes is an accumulation in the blood of the elements of an important secretion, say of the bile or urine, the second link is the rapid destruction of the secreting cells, the third link the arrest of the circulation in the capillaries, and the last link of the local chain the dilatation of the small arteries, and an increased flow of blood. An increased action of the heart is all that is necessary to complete the idea of inflammation as it commonly presents itself.

250. This succession of phenomena is strictly analogous to that pointed out by the late Dr. John Reid, as obtaining in asphyxia. The carbonic acid accumulating in a quantity too large to be eliminated by the secreting apparatus of the lungs, turgescence of the capillary vessels ensues, and death supervenes before inflammation has had time to develop itself. An excellent illustration of the share which the secreting cells have in bringing about the phenomena of inflammation is afforded by the kidney, in inflammation of that organ. The first link in the chain of causes is a rapid disquamation of the epithelial cells lining the urinary tubes; the detached cells clog the tubes; the blood in the capillaries is arrested, blood or serum is extravasated from the Malpighian tufts, and inflammation is set up. This subject will be again adverted to under the head of *Congestion*—(see § 271).

251. The processes of nutrition and inflammation are strictly analogous. In healthy nutrition, the cells which constitute the organic tissues attract from the blood, through the walls of the capillary vessels, the materials of growth and repair; while the liquor sanguinis, from which these materials have been abstracted, having dissolved the *debris* of the effete textures, is restored to the circulation by the absorbents and the veins. In adults, under ordinary circumstances, the formation

of new tissues exactly counterbalances the destruction of the old; but during the period of growth, and in certain parts of the system, as the womb and breast, to meet an occasional demand for increased activity, the process of nutrition is more active than the work of destruction. The same thing happens in some cases of subacute inflammation, which terminate in hypertrophy. In healthy inflammation, too, as has been proved by microscopic examination, the capillaries under the increased attraction of the tissues pour out liquor sanguinis, or coagulable lymph, rich in fibrin, and capable of developing cells by which the destructive effects of inflammation are repaired, or the tissues increase in bulk and firmness.

252. The enlargement of the capillary vessels in inflammation, then, is quickly followed by effusion. When the seat of inflammation is the cutis, as in the case of a burn, serum is thrown out from its surface under the cuticle, and a blister rises: when a mucous or serous membrane is inflamed, fluid exudes from its surface: when the cellular membrane is its seat, the effusion takes place into its cells. This effusion varies with the state of the system, the condition of the part, and the intensity and nature of the inflammation. In consequence of the difference existing in different persons in these respects, the same cause of inflammation (as a blister) will give rise to a different effusion of fluid in each case; the effusions presenting every degree of variety between a lymph abounding in fibrin, and a lymph rich in granules or corpuscles.

253. The lowest degree of inflammation in any of these parts merely increases the quantity of their natural secretion—of serum, in the case of the serous membrane, of mucus, when the mucous surfaces are inflamed. A higher degree of inflammation causes the effusion of coagulable lymph (the fibrin of the liquor sanguinis) or of pus. The increased natural secretion of the serous membranes is *dropsy*, or, when of limited extent, *œdema*; that of the mucous membranes, flux. Both these membranes, when the inflammation is more intense, pour out fibrin or pus. Thus the pleura secretes fibrin, which glues its surfaces together, and which becoming organized forms permanent adhesions; from the same cause arise adhesions of the peritoneum. The mucous membranes, too, in states of severe inflammation, pour out coagulable lymph, which sometimes takes the shape of the tube in which it is formed. This occurs in the larynx, in croup; in the bronchial tubes, in a peculiar form of bronchitis; in the intestines, in dysentery; in the kidneys, in inflammatory affections of those organs. These secretions assume so completely the shape of the tube in which they are formed, as to be sometimes mistaken for the lining membrane itself. Examples of the effusion of pus are, in the case of the serous membranes, empyema; in that of the mucous membranes, purulent ophthalmia, gonorrhœa, &c.

254. When the capillaries, dilated in inflammation, return to their natural size, and any fluid which may have been poured out into the sur-

rounding textures is absorbed, the inflammation is said to terminate by *resolution*; when blood is thrown out, by *hæmorrhage*; when serum, by *effusion*; when fibrin or coagulable lymph is formed and organized, by *adhesion*; when pus is effused, by *suppuration*; when the part dies, by *gangrene*. Inflammation of mucous surfaces or of exposed portions of cellular membrane, accompanied by the effusion of pus, and the more or less rapid removal of the part affected, constitutes *ulceration*. There is also a peculiar consequence of inflammation nearly allied to suppuration, and designated as *ramollissement*, or softening.

255. The generic term inflammation is often qualified by other words indicative of its character. Thus we have *œdematous* inflammation, or inflammation terminating in, or accompanied by, *œdema*; *adhesive* inflammation, or inflammation terminating in *adhesion*; *suppurative* inflammation, or inflammation issuing in *suppuration*; *gangrenous* inflammation, or inflammation ending in *gangrene*. The terms *acute* and *chronic*, *healthy* and *unhealthy*, *common* and *specific*, *phlegmonous* and *erysipelatous*, are also used to designate varieties of inflammation.

256. When inflammation attacks the cellular membrane, whether in the skin or in the parenchyma of internal organs, it takes different courses according to its intensity. If the inflammation be slight, it terminates in *resolution*; if more severe, *effusion* may take place: if more severe still, *suppuration*; if still more intense, *gangrene*. If a portion of the cellular membrane die, or if the effusion of blood, serum, or fibrin, be so large in quantity as to distend and break down the cellular tissue, pus is thrown out in small detached portions, which, by the solution of the intervening parts, coalesce, so as to form one single collection of purulent matter. Round this collection of matter, fibrin or coagulable lymph is thrown out, which becomes organized, and constitutes a *cyst* or *sac*. This collection of pus in a cavity bounded by a wall of effused and organized fibrin, is called an *abscess*. This term, like the term inflammation, is qualified in practice by phrases indicative of its character or progress; such as the *acute* or *phlegmonous* abscess and the *chronic* abscess.

257. Sometimes the constitution is not strong enough to build up and organize a wall of fibrin about the dead part, and then the pus finds its way into the surrounding cellular texture, and a *diffused abscess* is the result; or the inflammation is of a peculiar character, as in erysipelas, and suppuration takes place with little or no adhesive inflammation.

258. In rare instances the pus which has been thrown out is absorbed, and the abscess is said to be *dispersed*; but in the majority of cases fresh pus is formed, which causes the abscess to increase in size, and to press with augmented force on surrounding parts. Some of these parts yield to the pressure, and then the abscess is said to *point*. If the abscess is near the surface, the skin itself offers the least resistance; it is therefore protruded, and stretched more and more till it bursts.

259. When the matter of an abscess is discharged, the cavity which

contained it contracts, the lining of fibrin is cast off, and the walls become a suppurating surface, upon which fresh fibrin is effused. Part of this fibrin becomes organized by vessels, which either form within it, and then connect themselves with those of the surrounding parts, or are gradually extended into it from those parts. These newly-organized portions of fibrin are arranged in the form of small rounded vascular points, placed side by side around the cavity, and called *granulations*. From the surface thus created pus is secreted, which serves to protect the granulations from the air. In healthy persons the granulations are numerous, small, and florid, and coated with pus of a creamy consistence, known to the older surgical writers as *laudable* pus. Unhealthy granulations, on the other hand, are large, pale, and flabby, and discharge a thin and flaky pus. The various appearances presented by the granulations, and the changes which they undergo with alterations in the general health, form a subject of interesting and instructive study to the surgeon.

260. When the cellular membrane is divided by a wound, and the two edges of the wound are brought close together, fibrin is effused, which becoming organized, the wound heals; a narrow red line being left at first, which in process of time becomes pale. This is called a *cicatrix*, and the part is said to have healed by the *first intention*. But the part may not heal in this simple manner, and then an open sore or *ulcer* is formed, presenting the same characters as the walls of an abscess which has burst, viz., a collection of granulations.

261. These granulations, like those of an abscess, secrete pus, which moistens them and protects them from the air, while the pus which is nearest the surface, drying into a scab, renders the protection more complete. The new granulations, once completely organized, secrete fresh coagulable lymph, and this in its turn is organized so as to form new granulations; and thus the ulcer is at length filled up to a level with the surrounding skin, and covered by a layer of cuticle.

262. As a general rule, abscesses, whether formed in the integuments of the trunk or in the solid viscera of the body, tend towards the surface of the body; but to this rule there are exceptions. If, for instance, an abscess form in an internal organ, such as the liver, its firm parenchyma may offer more resistance than the loose texture of an adjoining intestine; hence the abscess exerts its chief pressure upon the coats of the intestine. This pressure sets up adhesive inflammation of the two layers of serous membrane; they are glued together by coagulable lymph; the peritoneum and the coats of the intestine thus become one continuous texture through which the abscess, continually increasing, forces its way, till it bursts and discharges its contents. Sometimes the course of an abscess is more circuitous. Abscess of the liver, for instance, may find its way through the diaphragm, and discharge itself into the air-passages of the lungs. Sometimes, again, an abscess formed in a solid viscus discharges itself into a serous cavity. Abscess of the lung opening into the sac of the pleura is an example in point.

As a general rule, the matter will be found to take the shortest course to its place of discharge. The most common exception to the rule is in the case of collections of matter formed beneath fasciæ, by which it is bound down and diffused.

263. *Ulceration* is a process very analogous to suppuration. It begins with inflammation of the skin, followed by effusion of serum or pus. The vesicle or pustule breaks, and leaves an uneven surface, covered with flakes of lymph, and moistened with pus. This surface may either heal in the way just described, or it may extend and enlarge by the destruction of the skin and subjacent textures. This destruction takes place more or less rapidly in different cases, according to the intensity of the inflammation. In ordinary cases the parts are removed gradually and almost imperceptibly; in other instances, this process goes on with great rapidity, when the ulcer is called *phagedenic*; in other instances, again, the inflammation is so intense as to cause the death of considerable portions of the cellular membrane. This is the *sloughing* ulcer. The two terms are also sometimes combined, to indicate ulceration of unusual rapidity, accompanied by gangrene. This is the so-called *sloughing phagedena*, or *hospital gangrene*. Ulcers are further designated as *acute* and *chronic*; *healthy* and *unhealthy*; *inflamed*, *indolent*, and *irritable*; *congestive*, *varicose*, *fistulous*, &c.

264. *Gangrene* is one of the terminations of inflammation; and the death of a limited portion of the cellular or other texture has been described as the occasional cause of abscess. The common boil may be mentioned as an example of a more extended death of the cellular tissue. But gangrene may take place without leading to the formation of an abscess. It may attack a limb, in consequence of the extreme debility of the circulation in it, and beginning in the foot, extend upwards, involving the entire circumference of the limb, until it reaches a part where the circulation is active enough to allow of adhesive inflammation, when coagulable lymph will be thrown out in a circle, dividing the sound from the dead parts; granulations will be formed, pus effused, and at length a natural amputation of the dead member will be effected. Thus, in consequence of the different effect produced by different degrees of inflammation, and of the various secretions thrown out in different stages of the process, the body is enabled to set limits to its own diseases, and to repair the most severe injuries.

265. Sometimes gangrene takes place without any accompanying inflammation, as in a limb of which the arteries are ossified, or in cases of poisoning with ergot of rye: this is distinguished as *dry* gangrene. A form of gangrene from extreme languor of the circulation in the lower extremities is peculiar to persons of advanced age, and is known as *senile* gangrene. The most common constitutional or predisposing cause of gangrene is debility; the most common exciting causes are severe mechanical injury, the action of violent irritant substances, and pressure; the immediate, or proximate, causes are a deficient supply of arterial blood, impediments to the return of the venous blood, and in-

jury or division of the nerves. The term *mortification* is commonly used as synonymous with gangrene; and the word *sphacelus*, or *slough*, is generally employed to characterise a part not susceptible of being restored to life, and which must be thrown off from the body.

266. A complete description of inflammation, including its causes, its phenomena, its terminations, the various modifications which it undergoes in different states of health, in every variety of constitution, and in every texture of the body, would exceed the limits of this work, and properly belongs to the province of the surgeon; but there is one species of inflammation which, on account of its great importance, must not be passed over in silence, namely, erysipelatous inflammation.

267. *Erysipelatous inflammation* is characterised by its tendency to spread over the skin or over the surface of membranes, by its attacking different parts of the body, either simultaneously or by *metastasis*, and by its contagious and infectious character. When its seat is the skin, the subjacent cellular tissue is more or less implicated, and the specific character of the inflammation is shown by the lymph which is formed being incapable of organization. In the milder forms of erysipelas, as in that which often attacks the face, the disease scarcely extends beyond the skin itself, when it is called *simple*, or *cutaneous;* in the more severe forms, however, the cellular membrane is implicated, when the disease is known as *phlegmonous* erysipelas.

268. Closely allied to erysipelas of the skin, and indeed intimately connected with it, is that inflammation of the peritoneum which occurs in puerperal fever, associated with acute inflammation of the veins of the uterus and of other parts of the body, with purulent deposits in the joints, and in the liver, lungs, and other viscera. The coexistence of erysipelas on the skin with puerperal fever, of erysipelas on the infant and puerperal fever in the mother, and the diffuse erysipelatous inflammation which is so peculiarly apt to follow on dissection wounds inflicted during the examination of the bodies of women who have died of puerperal fever, establish the intimate connection existing between this peculiar inflammatory affection of the skin and the equally peculiar disease known as puerperal fever. The connection between the two which was more or less distinctly indicated by the older writers on puerperal fever, has been thoroughly established by more recent authorities.

269. *Congestion* is a state of capillaries closely allied to that of inflammation. It consists of a passive enlargement of those vessels, unaccompanied by the symptoms of inflammation, unattended by effusion either of lymph or pus, but sometimes combined with an increase of the natural secretion of the part. This enlargement of the vessels is the effect of debility, and as such is apt to continue in parts in which the symptoms of acute inflammation have been subdued. It is of common occurrence in the aged, and in persons exhausted by long suffering. In addition to the capillary vessels, it involves chiefly the veins, whilst

inflammation has its principal seat in the arteries. This seems to be implied in the term *venous congestion*. Pressure is a common cause of this state: thus we have congestion of the veins of the leg after long standing, congestion of the vessels of the head from wearing a tight cravat, congestions in the lungs from impediments to the respiration, &c.

270. *Congestion of the internal organs* of the economy is a condition of very frequent occurrence, and one which plays a very important part in the development of organic disease, and in the hæmorrhage and dropsy which so frequently accompany it. Some of the causes of visceral congestion, such as cold applied to the surface, a continued dry state of the skin in febrile disorders, the plethora induced by a rich and stimulating diet combined with insufficient exercise, and hypertrophy of the left ventricle of the heart, are very simple and obvious. The continued action of these causes leads sooner or later to organic disease in some predisposed organ, such as the brain, the lungs, the liver, or the kidney; and hypertrophy of the left ventricle of the heart, to organic disease of several of those organs.

271. But besides this general internal congestion, leading to organic disease of some one of the congested organs, there are instances of internal congestion confined to a single organ, and forming one link in a chain of very interesting and instructive pathological changes; for an explanation of which we are indebted to Dr. George Johnson, who appears to have successfully generalized the results of his careful microscopic observations on the kidney.

272. If we take the kidney as an example, the primary source of the congestion in question would seem to be, in all cases, either an impure condition of the blood (the impurity consisting in the excess of some element which is destined to be eliminated by the kidney), or a process of desquamation strictly analogous to that which takes place on the skin in scarlatina. In either case, the first morbid change which takes place consists in desquamation or separation of the secreting cells. The cells are rapidly thrown off in large numbers, so that the tubes become clogged, and further secretion thereby impeded; or the tubes become altogether denuded of their cells. This leads to congestion of the intertubular capillary vessels, extending backwards to the Malpighian capillaries, which, according to the degree of congestion, pour out blood or serum; or, first, blood, and then serum. The blood thus poured out is partly discharged mixed with the urine, and partly separated into its constituent parts; the fibrin, and part of the colouring matter, coagulating in the tubes, and being voided in the form of cylindrical moulds. In simple desquamation of the kidney, these moulds have epithelium scales adhering to their external surface, but without oil globules. In more severe forms of disease, especially where the secreting tubes are denuded of their cells, oil globules are found blended with the epithelium scales. The local congestion thus set up, if extensive or of long continuance, constitutes an obstacle to

the movement of the blood, which ultimately affects the centre of the circulation, and leads first to violent action, and then to hypertrophy, of the left ventricle. This state of hypertrophy leads, after a time, to congestion of other internal organs, with hæmorrhages and effusions of serum; indeed, to the train of symptoms which are well known to follow on hypertrophy of the heart due primarily to other causes.

273. *Hæmorrhage*, as has been just stated, is a common consequence of the state of congestion, when it is termed *passive* hæmorrhage; but it is sometimes of a more *active* character, and appears to flow immediately from the arteries. Sometimes, again, as in many cases of hæmoptysis, it is caused by the rupture of an artery; at other times, as in hæmorrhages from the stomach and bowels, the blood seems to exude through the coats of the capillaries or veins. We may also have hæmorrhage into the ducts of secreting organs, such as the liver or kidney. In scurvy and in putrid fevers it is due partly to weakness of the vessels, and partly to thinness of the blood. Hæmatemesis, melæna, and hæmorrhoids, are examples of passive hæmorrhages. The copious discharge of red blood from the bowels, traceable by the use of the speculum ani to a small spot in the mucous membrane of the intestine, is a good example of active hæmorrhage.

274. It yet remains to consider two important functions to which the capillaries are subservient—viz., those of *nutrition* and *secretion*. These two processes are essentially the same; for each consists in the development of simple cells endowed with independent vitality, and capable of assimilating from the blood their own peculiar fluids.

275. The *secreting organs* themselves assume various forms; but their essential parts are a basement membrane coated with epithelial cells, and covered externally with a net-work of blood vessels.

276. In *nutrition* each separate cell runs through its course of gradual development and decay, the products of its decomposition (of which the first in order, as in all other forms of decay, is carbonic acid) being absorbed into the blood, and eliminated from the system by appropriate excreting organs.

277. In *secretion*, too, the epithelial cells, which form the essential secreting organ, are similarly built up, arrive at maturity by the absorption of materials constituting the secretion, and then break up and decay; but the products of this decomposition of the cells, blended with their discharged contents, instead of being absorbed into the blood vessels, are poured into tubes fitted for their reception and discharge.

278. The fluids poured out by the secreting organs are known as *excrementitious* and *recrementitious*; that is to say, they are destined to immediate expulsion from the body as being hurtful, or to serve some useful purpose in the economy.

279. To the class of *excrementitious* matters belong the urine, the sweat, the water, and carbonic acid exhaled from the lungs, a small portion of the bile, the secretions of the several mucous membranes of the body, the menstrual discharge, and the hair, cuticle, and nails. The milk and semen, though they answer no further purpose in the economy, differ from other excrementitious matters in not being injurious to the system.

280. Of the *recrementitious* secretions some (as the secretions of the salivary glands, stomach, liver, and pancreas) subserve the process of digestion; others (as the tears, and the watery secretion of the Malpighian tufts of the kidney) serve to cleanse the surface of the eye and the urinary tubes respectively; others again (as the sebaceous secretions of the skin, the mucus of the mucous membranes, and the aqueous secretion of the serous membranes), protect from injury the parts which they moisten.

281. Another secretion not destined to immediate expulsion from the body consists of the fat which is deposited in the adipose cellular tissue, and which is employed to give roundness to the form, to facilitate motion, to protect the external parts from cold, and to serve as a store of nourishment.

282. The fat forms an example of secretion into cells. Examples of secreting organs in the form of membranes are the serous membranes (the pleura, the peritonæum, the arachnoid, and the synovial membranes of joints); the mucous membranes (that lining the alimentary canal and the parts communicating with it, and that lining the urinary passages and organs of generation); and lastly, the skin, a compound organ containing a variety of secreting glands.

283. *Glands*, in the usual acceptation of the term, are of three kinds—1, collections of blood-vessels, as the spleen, and the placenta; 2, lymphatic glands, which are similar congeries of lymphatic vessels; and 3, true secreting organs. These latter are of two kinds, the one secreting into cells a fluid destined to be again removed by absorption e. g., the thymus and thyroid glands; the other furnished with ducts for the discharge of fluids, which either subserve other purposes in the economy, or are thrown off as useless. These organs all consist of an excretory duct, which, if we trace it backwards from its trunk, divides into branches, and these again into others of smaller size, until the smallest terminate in blind extremities of various shapes, called cells, cryptæ, acini, &c. On the outside of these minute terminations, the capillary blood-vessels ramify, and the appropriate secretion permeating the invisible pores of these vessels, drops into the cell, crypt, or acinus, and thence flows into the duct. The blood which is not used in the secretion is returned by appropriate veins.

284. In the case of the kidney, the secreting apparatus is more complicated, consisting of a tuft of vessels (the Malpighian body), which secrete water, and of tubes lined with epithelium which eliminate the

solid constituents of the urine; the water serving to wash out these solid matters—an operation, assisted, in reptiles and fishes, and probably in mammalia also, by the cilia which line a portion of the tubes.

285. Secretion, like nutrition, is subject to differences in degree and in kind. The natural secretion of a part is augmented by increased flow of blood, provided severe inflammation be not present: increased perspiration from exercise, and diarrhœa from slight inflammation of the mucous membrane of the bowels, are examples of this. It may also be increased by debility of the capillary vessels, when the circulation is languid, as in the cold sweats following a fainting fit or preceding dissolution. The nerves, too, have great effect on the secretions, as is seen in the flow of tears from grief, joy, or other violent emotion, and in the effects of fear or anxiety on the skin, breasts, kidney, and bowels. On the other hand, the natural secretion of a part is diminished when it receives a small quantity of blood; as is the case with the skin in the cold stage of fevers; or when it receives much more than its usual quantity, as in the hot stage. In this latter case, as soon as the fever subsides, and the quantity of blood sent to the skin is diminished to a certain point, the sweating stage begins. Mental emotion, likewise, checks some of the secretions. Thus fear, which increases the secretion of the skin, checks that of the salivary glands, and the mouth becomes dry and parched.

286. But secretion varies in *kind* as well as in degree; in other words, the secretions are liable to a variety of morbid changes. Thus, the serous membranes, which in health secrete but a small quantity of serum, under a certain degree of inflammation, pour out an increased quantity, and dropsy results; a higher degree causes effusion of liquor sanguinis; a different and perhaps higher degree, of pus. The mucous membranes, according to the degree of inflammation, secrete a serous fluid, or fibrin, or pus, or all these secretions blended in different proportions. They may all be observed in the course of a severe attack of coryza.

287. Very serious consequences are constantly resulting from the suppression of secretions, or from the non-elimination of some of their important constituents. Jaundice, from suppressed secretion of bile, is an example of the suppression of an entire secretion, followed by symptoms of constitutional disturbance. The non-elimination of *urea*, or of its combinations, by the kidneys, is an example of partial suppression followed in slight cases by erythematous swellings and boils; in more severe ones, by gout and rheumatism; in extreme cases, by fatal coma.

288. What has been said of the similarity of structure existing in the several secreting organs will prepare us to view, without much surprise, the assumption by some of the secreting organs of the functions properly belonging to others. This is termed the *metastasis* of secretions.

Familiar examples of this phenomenon are, the secretion of urine, or of a fluid very nearly resembling it, by the skin and several of the mucous surfaces; of bile, by almost all the secreting organs of the body, as in jaundice; of milk, by the skin and lungs; and of the menstrual flux, by the vessels of the nose, lungs, and stomach, and from the surface of ulcers. Such vicarious discharges are not of very rare occurrence.

289. *The veins.*—The veins are larger than the arteries, and have no elastic coat. The larger veins of the extremities also differ from the arteries in being provided with valves to prevent regurgitation, and give support to the column of blood which they contain.

290. The circulation through the veins is effected mainly by the impulse of the heart continued through the capillaries. It is also assisted by the contraction of the muscles of the extremities, which, aided by the position of the valves, presses the blood towards the heart. The movement of blood in the great veins near the heart is further accelerated by the act of inspiration, and partly, as some suppose, by the suction of the heart itself.

291. At each inspiration, the cavity of the chest is enlarged by the descent of the diaphragm, and by the elevation and tilting outwards of the ribs. The enlargement thus effected tends to produce a vacuum, which must be prevented by the entrance of air, or blood, or both. Experiments have shown that the motion of the blood in the large veins is thus accelerated. That this effect on the circulation is produced, is shown by the admission of air into a wound in the larger venous trunks, but its influence does not extend beyond the axillary vein. It has also been shown experimentally, that at each systole of the heart a tendency to a vacuum exists in the pericardium, which is prevented by the blood of the large veins distending the auricles.

292. The assistance given to the venous circulation by inspiration is somewhat counteracted during expiration, when the pressure exercised on the contents of the chest causes regurgitation of blood into the larger veins. There is, however, a balance in favour of the circulation, the effect of inspiration being greater than that of expiration.

293. When the right auriculo-ventricular valve admits of regurgitation, the blood flows back into the descending cava and jugular vein, causing a *venous pulse.*

294. Experiments have shown that poisonous substances introduced into wounds soon find their way into the veins. This proves either that the veins themselves absorb, or that the capillaries which terminate in the veins possess this power. It is through this absorption into the circulation that poisons act; hence the efficacy of ligatures applied above wounds, of the abstraction of the blood below the ligature, and of the application of cupping-glasses, which answer the double purpose

of a ligature and evacuator. The subject of absorption demands, however, a few words more.

295. *Absorption* is of two kinds; the absorption of fluids and the absorption of solids, or interstitial absorption. The capillaries, the veins, or both, have the property of absorbing fluids; but in addition to these, the lacteals and the absorbents, properly so called, are provided, the one for the absorption of the chyle from the intestines, the other for the absorption of lymph from every part of the body.

296. Absorption is certainly effected in more ways and by more means than one. Living and dead tissues allow the passage of fluid and gaseous matters through them. To this process the term *imbibition* is applied.

297. If two gases are in contact with the moist surfaces of a bladder, one being within it, and the other external to it, both will permeate the bladder till they are equally mixed. A gas, likewise, will permeate a moist bladder to mix with a fluid within it. This takes place in the lungs. Again, if a vessel be filled with water, and a moist bladder be tied over its mouth, so that the fluid is in contact with the bladder, and a salt be strewed over its surface, it will be dissolved by the water which permeates the pores of the bladder. If a tube filled with a solution of salt or sugar, and closed by a piece of bladder, be placed in water, the water permeates the bladder, mixes with the solution, and rises in the tube. At the same time a portion of the fluid contained in the tube traverses the bladder in an opposite direction, and this interchange takes place till the fluids on both sides of the bladder have become homogeneous. If the arrangement be reversed, so that the denser liquid is external to the bladder, and the rarer liquid in the tube, the liquid in the tube passes through the bladder, and gradually sinks to a lower level. These phenomena have been named by Dutrochet "endosmose" and "exosmose."

298. Matters in solution pass into the capillaries, and thence into the venous blood, by this process of "endosmose," which goes on the more rapidly as the denser fluid (the blood) contained within the vessels is no sooner diluted than it gives place to a fresh portion, and thus endosmose takes place more completely, and goes on more constantly than in fluids at rest. By "endosmose," then, matters held in solution, provided the solution be not of greater density than the blood itself, find their way into that fluid.

299. This process of absorption by the capillaries and veins is very rapid. In a part free from epidermis it is almost instantaneous; and minute portions of fluid, or of substances held in solution, may not only be absorbed, but may be distributed through the circulating system in from half a minute to two minutes, or even less. In this way the rapid action of the more energetic poisons may be explained. One poison only, hydrocyanic acid, has been thought to act too

rapidly to have its fatal effects thus accounted for; but Mr. Blake's experiments have shown that even this poison must be absorbed in order that it may destroy life. It has been also shown that when the vapour is prevented from entering the lungs, its fatal action is retarded.

300. The rapidity with which absorption takes place is well illustrated by the rapid passage of certain salts from the stomach to the kidney. In one experiment made by Westrumb, prussiate of potash was detected in the urine in two minutes from the time of its being taken into the stomach; and in the history appended to a cast of the Epispadian Arburg, in the museum of King's College, it is stated that fluids may be seen trickling from the ureters into the bladder in from two to three minutes after they have been swallowed.

301. Several agents affect the rapidity with which imbibition and absorption take place. Galvanism is the chief of these. Thus Fodere has shown, that when sulphate of iron is introduced into the peritonæum, and prussiate of potash into the pleura, five or six minutes usually elapse before the two substances combine, but that their combination is instantaneous when a slight galvanic current is passed through the diaphragm. This fact explains the efficacy of galvanism in promoting the absorption of fluids. Distension of the vessels renders absorption less rapid; depletion, on the other hand, accelerates it. Hence, the use of venæsection in dropsy. Imbibition takes place more slowly in parts covered by dense membranes. This is the case with the skin, of which the power of absorption is much increased by removing the cuticle. To facilitate absorption by the skin, friction is used, by which means medicines and nourishment may be introduced into the system.

302. The absorption of fluids, provided they be of less density than the blood, is thus easily accounted for by endosmose, which probably takes place chiefly through the coats of the capillaries or veins, and it is by this means, as just stated, that poisons find their way into the system. But the absorbent vessels seem destined to take up and restore to the circulation the serum (that is to say, the liquor sanguinis, *minus* the fibrin that has been used to build up the solid textures of the body) which has exuded through the parietes of the capillaries. They rarely contain either matters introduced from without, or abnormal secretions of the body itself.

303. The absorbents leading from poisoned wounds, and from simple punctures in certain unhealthy states of the system, are very apt to become inflamed, the inflammation often extending to the absorbent glands, and exciting inflammation and suppuration in them. The absorbents are also most probably the instruments by which interstitial absorption (absorption of the structure of the body itself) is brought about.

304. Of disordered function of the absorbent vessels little is known.

Formerly all dropsical effusions were attributed to some fault of the absorbents, and remedies were given to promote absorption by stimulating those vessels into activity. There can be no doubt that the functions of the absorbents, like those of other vessels, vary in activity at different times and under different circumstances; but as the veins have been proved to possess the power of absorption as well as the lymphatics, it is difficult to assign to each class of vessels its proper sphere of activity, whether in health or disease. It has been shown, for instance, by direct experiment, that the veins absorb poisons, but it is no less clearly demonstrated by disease, that some poisons excite inflammation in the entire course of the absorbent vessels, and in the glands through which they pass: and this is attributed, and probably with justice, to the absorption of the poison by these vessels.

305. But whatever may be the precise share taken in the process of absorption by the veins and absorbents respectively, there can be no doubt that the influence of the absorbents in the production of dropsies has been much exaggerated. These effusions arise in various states of the system, and from various causes. Mechanical obstruction, venous congestion, inflammation, and debility, all cause effusion of serum—an effusion too abundant to be removed by the unaided though still healthy action of the absorbent vessels. If the obstruction be overcome, or the venous congestion removed, or the inflammation subdued, or the strength restored, the effusion ceases, and time alone is required to enable the absorbent vessels, whether veins or lymphatics, to take up the fluid which has been poured out.

306. The doctrine that dropsies are generally due to a defective action of the absorbents is in opposition to the notorious facts that patients suffering from dropsy are very readily affected by preparations of mercury, which must be absorbed before they can act, and that the adipose tissue in such patients is often very rapidly removed, so as to occasion great emaciation.

307. The well-known efficacy of venous distension in preventing absorption, and of depletion in promoting it, point at once to the most efficacious means of removing dropsical effusions, viz., blood-letting, and the increase of the several secretions. If there is sufficient strength of constitution, these means will suffice for its removal; if not, tonics or stimulants must be combined with the antiphlogistic measures.

308. The absorption of the solid structures has also been attributed to the increased action of the lymphatics, but perhaps without sufficient reason. Pressure, friction, and electricity, as well as mercury and iodine, are as likely to affect the capillaries which are the cause of the morbid growth, as the lymphatics or veins which are instrumental in removing it—moderate pressure, by giving support to the capillaries; stronger pressure, by still further diminishing their size; friction and electricity, by stimulating the coats of the small arteries, and restoring

their contractility; and iodine and mercury, by a local action on those vessels, whether through the skin, or more circuitously through the circulation. The cessation or gradual removal of such tumours by these agents may be much more satisfactorily explained in this way than by an action upon the absorbents.

309. In the case both of dropsies and tumours, the result is the same, whether the capillaries, ceasing to secrete fresh fluids or solids, the absorbents, without any increase of activity, remove by degrees that which has been effused; or the capillaries, continuing to secrete, the absorbents are excited to a corresponding increase of activity. The only difference is this, that according to the former supposition, the cause is permanently removed; according to the latter, the effect is merely counteracted. The first supposition seems most feasible.

310. The physiology and general pathology of the circulating system would be incomplete if some reference were not made to the peculiarities which mark the circulation of the blood through the brain.

311. The *brain* differs in some important particulars from all other viscera. Those of the abdomen are contained in a yielding cavity with muscular parietes; those of the chest in a cavity consisting partly of bone and partly of muscle, but allowing of a considerable increase and diminution of size in all directions; but the brain is shut up in an unyielding cavity of bone. All these cavities are air-tight, but that of the cranium alone is both air-tight and unyielding, at least in the adult. It follows, then, that whilst all the cavities of the body must always be full, the cranium alone must always contain the same amount of matter, for the atmospheric pressure of 15 lbs. on every square inch of the surface of the body keeps the brain full, as it does a syphon. Now the brain consists of a mass of nervous matter, supplied with blood by a large number of vessels, and there is no reason to believe that this matter can suffer compression any more than so much water; at least the strongest pressure which can be exerted upon it in the living body would probably not be rendered perceptible by the most delicate instrument. It is also an undoubted fact that so long as the arteries and veins contain their due proportion of blood, the brain is not affected either by an increase or diminution of the pressure which it ordinarily sustains. A man who descends in a diving-bell thirty-four feet below the surface of the water, sustains an additional pressure of 15 lbs. on every square inch of his body, and yet his brain does not suffer. On the other hand, a man ascending a lofty mountain, or going up in a balloon, has the pressure on his body, and consequently on the vessels of his brain, materially diminished, and yet his brain is not affected. Thus the inhabitants of some of the valleys among the Andes, who live as far above the sea as the summit of Mont Blanc, suffer only half the pressure which the body has to bear at the level of the sea, and yet they enjoy health both of mind and body. Again, the head of the infant suffers severe pressure during

birth, and the yielding cranium of the child allows of large accumulations of fluid, and yet the brain suffers nothing during birth, and often very little in hydrocephalus.

312. Mere pressure, then, does not affect the functions of the brain, and yet men are said to die of pressure on the brain. When blood, or serum, or lymph are found on the surface or in the ventricles, or a tumour in the substance of the brain, or a larger quantity of blood than usual in some of its vessels, death is said to have been occasioned by pressure. This statement is incorrect; pressure there is none. How, then, is the fatal result to be accounted for? Simply thus: the brain, like all other organs of the body, is dependent for the due performance of its functions on its supply of blood, and a tumour or fluid within the cranium, by occupying space there, deprives the brain of a quantity of blood equal to its own size; and the functions of the brain suffer in proportion to the loss which it sustains. The functions of the brain most open to observation are voluntary motion and sensation, both of which are lost or greatly impaired. The less obvious functions—that is to say, the supply of nervous power to the more important viscera, especially those of circulation and respiration—are equally impaired: hence the infrequent pulse and respiration.

313. Loss of sensation and voluntary motion, and infrequent pulse and respiration, are among the most prominent symptoms of apoplexy; and all the others, whether occasional or constant, admit of the same ready explanation. When the supply of blood is cut off at once, as by the sudden pouring out of blood in the more common form of apoplexy, the symptoms are often more strongly marked, though the quantity of blood effused is very small, than in cases of slow effusion of fluid or the slow growth of tumours within the cranium, in which cases the brain adapts itself by degrees to the new circumstances in which it is placed. Sometimes the quantity of blood effused is too small to account for the serious disturbance of the functions of the brain by the mere displacement of a few drops of the circulating fluid. Of these cases there is a ready explanation in the fact, that instances have occurred in which all the symptoms of apoplexy have been present without a single morbid appearance after death, except a disproportionate quantity of blood in the veins; and it is highly probable that the cases of apoplexy now alluded to, combine with the small effusion of blood this same want of balance in the circulation. If the fatal effects of such small effusions of blood appear inexplicable on this supposition, they are to the full as difficult of explanation on the received principle of pressure.

314. The intimate connexion which exists between the vessels within the brain and those of the scalp and face is sometimes a source of relief and safety in sudden determination of blood to the head. The flushed and turgid face which accompanies apoplectic seizures, and the engorgement or rupture of the vessels of the scalp, in cases of death by hang-

ing or strangulation, in which the vessels of the brain contain only the usual quantity of blood, are familiar illustrations of this fact.

315. There are cases of apoplexy, then (that is to say, cases in which the functions of the brain are greatly impeded), in which no other cause can be assigned but a want of balance in the circulation. Is this a sufficient cause? Without doubt it is. Suppose the extreme case, that the arteries contain scarcely any blood, while the veins are full of it; it is obvious that the brain is in as bad a condition as if it had received no blood at all, or its vessels were filled with warm water. When the venous blood is less decidedly in excess, the functions of the brain, of course, suffer less; and these slighter disturbances in the balance of the two circulations probably account for the various conditions of the mind in our waking and sleeping hours. On the other hand, if the circulation through the arteries be increased, instead of torpor of the functions of the brain, we have those of excitement, heightened sensibility, strong muscular contractions, violent delirium, raving madness.

316. This balance of the circulation may be disturbed in various ways. Blood may be accumulated in the veins by pressure upon the jugular veins or on the carotid arteries. As the change of arterial into venous blood is constantly going on, an arrest of the circulation in either direction will have the effect of increasing the quantity of venous blood in the brain, and this will be followed by sleep, more or less profound, by coma or apoplexy. Pressure, then, is one disturbing cause. An arrest of the heart's action, by putting a stop at once to the circulation through the brain, produces syncope, which differs from apoplexy merely in degree, the one arresting every function of the body, the other merely oppressing them more or less. A very feeble action of the heart will be attended with the same result; for the arteries of the brain receiving little blood, and the change from arterial to venous blood still going on, the brain must contain but a small quantity of arterial blood, and must consequently perform its functions imperfectly. Hence, the deep sleep or coma which often attends extreme debility, and hence the turgid condition of the veins of the head when death follows upon hæmorrhage or other debilitating cause. In these cases, however, an effusion of serum generally accompanies the turgescence of the veins. Increased action of the heart, on the other hand, causes the brain to receive an undue proportion of arterial blood; hence the delirium and other symptoms of violent excitement which attend severe inflammation and inflammatory fevers.

317. The incautious use of the lancet in cases of inflammation of the brain often produces this very derangement of the circulation. The bold practitioner, not content with reducing the circulation through the arteries and veins to a state of equilibrium, carries depletion to the extent of greatly diminishing the quantity of the circulating fluid, and enfeebling too much the action of the heart. The consequence is, that

the arteries receive little blood, the veins contain an undue proportion, the circulation through the brain becomes languid, the capillaries pour forth serum into the ventricles or on the surface, and the patient dies comatose.

318. All the organs of the body require, for the due performance of their functions, that the blood should traverse them with a certain degree of rapidity; a sluggish circulation, therefore, is attended with sluggish functions. This observation, of course, applies to the brain in common with all other parts of the frame: the effect, therefore, of a sluggish circulation through that organ will be a torpor in the functions which it performs—this torpor constitutes, according to its degree, sleep or coma.

319. *Sleep* comes on, for the most part, at that period of the day, and in that posture, in which the circulation is the most sluggish, viz., at night and in the horizontal posture. Now it may be stated, as a general rule, that the pulse falls towards evening, and it may be added, that it is less frequent in the horizontal than in the erect position of the body. These two circumstances, then, which favour a slow circulation of the blood, also favour sleep, and partly explain its occurrence. But other causes must be taken into account, such as the darkness and silence, the absence of the usual impressions on the senses, and the exhaustion of the nervous system. This exhaustion reacts upon the circulation, and the circulation, in its turn, reacts upon the brain. Sleep, then, may be considered as due partly to exhaustion of the nervous system itself, partly to the absence of impressions on the organs of sense, and partly to the languid circulation through the brain. The negation or absence of any of these conditions produces wakefulness. Intense cold, which is another familiar cause of sleep, probably acts, partly by causing an accumulation of blood in the interior organs of the body, and partly as a direct sedative. A languid circulation through the brain will result in either case. In the cold stage of ague, the same state of circulation exists, and the same condition of brain. When this is of long continuance or of great severity, deep sleep or coma occurs.

320. Among other causes of this state may be mentioned repletion, and a certain stage of intoxication. The sleep which follows full meals may perhaps be explained by the circulation through the brain of the products of digestion not yet fully converted into blood; spirituous liquors act as a poison, stimulant in a small dose, and narcotic in a larger one.

321. The circulation through the brain varies much with the posture of the body. In the erect posture, the heart, in sending blood to the brain, has to oppose the force of gravity; but in the horizontal posture the heart has but little resistance to overcome. Hence, when the heart is feeble and the system drained of blood, a sudden change from the recumbent to the sitting or erect posture will sometimes cause fatal

syncope; and, on the other hand, a patient who has fainted in the erect posture is soon restored by being laid on the back. When the head is dependent, the return of the venous blood to the heart is opposed by gravity; the balance of the circulation is therefore destroyed, and coma is threatened. Thus apoplexy has been sometimes induced by sudden stooping to tie a shoestring or pull on a boot.

322. The fact that the flow of blood to the head is favoured by the recumbent, and retarded by the erect, posture, suggests the treatment to be adopted in cases of disease of the brain. Where there is high arterial action, the head should be raised; where there is much debility, the body should be placed horizontally. Such changes of posture are often attended with the best effects; thus instances are recorded in which pain, intolerable in the horizontal posture, has been at once removed by assuming the erect position.

323. When, again, it is desirable to produce a sudden and strong effect on the system by the abstraction of blood, the patient should be placed in the erect posture, for the heart soon loses the power of sending the blood upwards to the brain, and fainting follows as a consequence. The same position should be adopted when it is our object to obtain the greatest effect with the least expenditure of blood.

324. Cerebral excitement is directly opposed to the states of sleep and coma, and arises from an opposite state of the circulation through the brain. The degree of violence displayed bears a pretty exact relation to the rapidity and force with which the arterial blood is circulated, and to the strength of the patient. In the strong and robust, the outward manifestations of the disturbance which the brain is suffering are violent, and the muscles contract with great force; but if the strength is much exhausted, the loud talking of furious delirium is exchanged for low muttering; the violent muscular efforts for subsultus tendinum; and the distinct impressions on the senses for muscæ volitantes, and tinnitus aurium.

3. STRUCTURAL PHYSIOLOGY AND PATHOLOGY.

325. In the two previous chapters the human body has been examined, first, as a chemical laboratory, in which the functions of digestion, assimilation, and sanguification are carried on; and, secondly, as an hydraulic system, by which the blood is distributed. It is next to be considered as an assemblage of minute structures, by which all the parts and organs are built up, these structures being nourished by the blood conveyed to them by the arteries, and more immediately supplied to them by the capillary vessels.

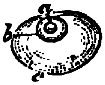
326. It has been already stated that the circulating system, consisting of arteries, capillaries, and veins, forms one continuous and unbroken, though most minutely divided, reservoir of blood in motion. The arteries serve as carriers of pure blood *to* the several tissues, the veins as

carriers of impure blood *from* them, while the capillaries, as the immediate agents of growth and nutrition, connect the two classes of vessels. As the capillaries have no open mouths, the tissues can be nourished only by transudation through their walls.

327. There is reason to believe that the fluid thus employed in the work of nutrition is the *liquor sanguinis*; or, in other words, the blood itself less the red particles. Many of the capillaries, indeed, transmit only this colourless liquid. As the liquor sanguinis contains both albumen and fibrin, and all the other elementary substances necessary to nutrition, it is obvious that it is equal to the use thus assigned to it.

328. The mode in which the liquor sanguinis exudes through the coats of the capillaries, and, being brought into contact with the tissues, subserves the purposes of nutrition and growth, has been recently explained by the comprehensive theory of Schleiden and Schwann. Those accurate observers have shown that all the tissues of the body consist of cells, or are formed out of them; and that these cells consist originally of three distinct parts:—*c*, the cell-membrane; *b*, the nucleus, or *cytoblast;* and *a* the nucleolus.

Fig. 4.



329. These cells are developed in a fluid (in the case of the healthy tissues and of the new textures generated by healthy inflammation, the liquor sanguinis), which fluid has been termed the *cytoblastema*, or cell-producer. The cell, once formed, grows by its own inherent powers; and as it contains a fluid similar to that out of which it was formed, and is surrounded by the fluid in which it originated, similar cells, with the same constituent parts, form sometimes within it, and sometimes external to it.

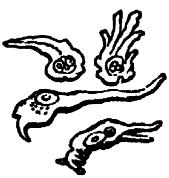
330. The cells, which have a rounded form when floating free in the cytoblastema, may increase in number so as to press against each other; in which case they assume with more or less regularity, the hexagonal form which vesicles so circumstanced always put on. If the intervals between the cells are supposed to be occupied by an unorganized deposit of greater or less consistence, we have the essential elements of the harder tissues, such as cartilage or bone. If the cells, instead of being round or oval, are supposed to assume elongated forms, we have the elements of the fibrous tissues; and, lastly, if cells arranged in lines with their ends in apposition are supposed to have their opposed walls removed by absorption, we have the several hollow tubes, such as arteries, veins, absorbents, the sheaths of the nervous matter, &c.

331. But the theory of cells is applicable not merely to the solid structures of the frame, but also to some of the fluids both in health and disease. Thus the red particles which float in the liquor sanguinis of the blood are nucleated cells; so also are the lymph globules. The secretions of mucus and pus thrown out from inflamed surfaces contain, in like

manner, their peculiar and characteristic mucus and pus-globules. In healthy pus formed on the surface of a wound, these pus-globules become organized, and constitute the successive layers of granulations. The superficial granulations present cells which resemble the pus-granules; in the deeper strata the nuclei are very distinct, and the envelopes polygonal from mutual pressure; while in the still deeper layers the envelopes of the cells are seen passing through all the gradual transitions of the fibres of areolar tissue. Such is an abbreviated description of this curious process of reparation as verified by Henle, by the aid of the microscope.

332. Recent pathological researches have shown that the cell-theory also admits of application to malignant morbid growths. The liquor sanguinis or cytoblastema which exudes through the capillaries, instead of furnishing the materials for healthy cells destined to build up healthy tissues, supplies the elements of cells of the peculiar form and character of those depicted in the annexed engraving, and which form a constituent part of cancer.

Fig. 5.



333. But although the cell-theory is thus shown to apply to diseased no less than to healthy growths, it has but a limited application in morbid anatomy; many structural changes being dependent upon widely-different causes.

334. One class of structural changes, for instance, consists in a simple enlargement of hollow organs dependent upon mechanical causes: such as enlargement of the stomach, of portions of the large intestines, or of the urinary bladder from habitual distension; of the veins of the extremities from pressure on the large venous trunks; and of the anastomosing branches of arteries as a consequence of the application of a ligature to the main artery.

335. A second class of structural changes consists in *abnormal nutrition*, without any change in the minute texture of the parts affected. This abnormal nutrition may be excessive or defective. The former is called *hypertrophy*, the latter, *atrophy*.

336. The principal cause of *hypertrophy* is increased action: this is shown in the muscles of the athlete; in the heart when it encounters some obstacle to the circulation, and is obliged to contract with additional force to overcome it; in the uterus during pregnancy; in the mammæ of the female when secreting milk; in the mucous membrane of the bladder exposed to constant irritation from stone or gravel.

337. *Atrophy* arises from opposite causes; from disuse of parts, as of the muscles in the sedentary, in the paralytic, and in the bedridden; from obstruction to the flow of blood by ligatures; or from the operation of certain powerful medicines, such as iodine and the salts of lead.

Atrophy is accordingly accompanied by paleness of the parts affected: hypertrophy by increase of colour.

338. Hypertrophy and atrophy are sometimes limited to one constituent part of a texture. Thus bone sometimes assumes unusual hardness, from the crowding of several earthy particles into the space commonly occupied by a few. On the other hand, the bones are subject to softening, from an absence of the earthy matter. This constitutes mollities ossium.

339. A third class of structural changes consists of the effects of common inflammation, already described, and due to common causes.

340. A fourth class would comprise the effects of inflammation due to specific causes; as, for example, the inflammation and suppuration of the lymphatic glands in syphilis, plague, and glanders, and as a consequence of wounds received in dissection; the inflammatory affections of the skin which characterise the febrile exanthemata; and the local deposits or formations of pus in the lungs, liver, serous cavities, and joints which supervene upon phlebitis.

341. But in addition to these structural changes, most of which are of very frequent occurrence, we have a large class of diseased conditions which are not so readily referred to distinct heads. These have been thrown into two leading classes under the designations *analogous* and *heterologous*.

342. It has been already stated that the liquor sanguinis, acting as the cytoblastema or cell-producer, forms the matrix in which a variety of adventitious growths are deposited, such as the cellular, the serous, the fibrous, the cartilaginous, or the osseous. These adventitious growths are usually determined by the nature of the texture in or upon which they are formed; thus they resemble serous membrane in the cavity of the pleura or peritonæum, they are often cartilaginous in joints, and bear a close resemblance to muscle in the uterus. Such formations are called *analogous*, because they are similar to those naturally forming part of the body. When such formations have no resemblance to natural structure, they are termed *heterologous*.

343. The class of *analogous* formations is a very large and a very important one, and comprises some of the most fatal diseases of the secreting organs, especially the liver and kidney, as well as several morbid states of the arterial system.

344. Recent investigations have demonstrated the very frequent part which deposits of fat or oil globules play in the production of diseases in some of the most important organs of the economy. Microscopic examinations have shown the presence of fat in large quantities in the epithelial cells of the liver and kidney in the fatty degeneration of the liver, and in certain forms of Bright's disease of the kidney. In the case of the last-named organ, moreover, the same deposits have been found in the cells expelled with the urine, so as to furnish evidence

during life of the character of the disease of which the kidney is the seat. The annexed illustrations show the mode in which the oil globules are deposited in the cells of these organs. In Fig. 6, *a* represents healthy cells of the liver, free from fat globules; and *b*, cells from a liver in a state of fatty degeneration. In Fig. 7, *a* represents healthy epithelial cells of the kidney, and *b*, cells loaded with fat globules.

Fig. 6.

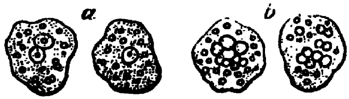
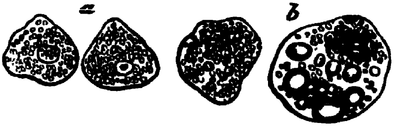
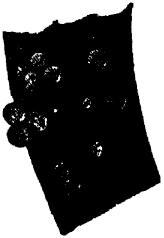


Fig. 7.



345. These deposits of fat are not confined to the epithelial cells of the secreting surfaces, but exist also in the cellular tissue connecting the vessels of the secreting organs. The first effect of these deposits of fat in situations where such deposits are not found in a state of health, is to increase the size of the diseased organs without materially affecting their functions; but in more advanced stages of the disease the fatty deposits, by encroaching more and more on the vessels and secreting apparatus, impair the secreting power of the cell on the one hand, and restrict the supply of blood on the other. Hence, in extreme cases of fatty degeneration, the organs affected are reduced to a state of *anæmia*, and become quite unequal to the performance of their functions. In these cases the organ, instead of increasing in size, may actually shrink from the cessation of nutrition and the absorption of the fat globules, the deposition of which was the original cause of the disease. But the agency of deposits of fat in producing organic disease is not limited to the secreting organs. It extends also to the several tissues of the body. Those deposits are laid down, for instance, in the structure of the heart, constituting fatty degeneration of that organ, and enfeebling it by encroaching on the space which in health is occupied by muscular fibres. The degenerated muscular structure is a frequent seat of calcareous deposit. The form which this fatty degeneration of the muscular texture of the heart assumes under the microscope, is shown in the subjoined engravings from a paper in the "Medical Gazette," 1849, by Dr. E. L. Ormerod.

Fig. 8.



346. Fatty deposits are also of frequent occurrence in the coats of arteries, which are often found subject to this species of degeneration in subjects affected by similar disease of the liver and kidney.

347. The situation of these deposits in the arteries is either the cellular membrane between the inner and middle coats, or the fibres of the

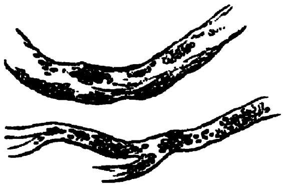
middle coat itself. They are known as *atheromatous* degenerations. When they occur in the middle coat of the larger arteries, they take the place of the healthy structure, impair its elasticity, and lead to dilatation of the vessel. In the smaller vessels they are often carried to such an extent as to obliterate their cavities, and thus to cut off the supply of blood from the parts to which they are distributed. Thus, when the coronary artery of the heart is the seat of atheromatous formations, the muscular substance of the heart itself becomes atrophied. This class of deposits is found to obey the law of symmetry, attacking equally and similarly the vessels of both sides of the body.

348. The atheromatous deposits in the coats of the arteries often become the seats of ulceration, leading to perforation of the vessels and sudden death from hæmorrhage. When the ulcers make their way through the inner coat of the arteries, they project as ragged uneven tumours from the inner coat, and when they occur in the aorta, are frequent causes of abnormal blowing and sawing sounds.

349. In another very numerous class of cases the atheromatous spot becomes the nidus of calcareous deposit, and the vessel is said to degenerate into bone.

350. The small arteries, veins, and capillaries of the brain have also been observed subject to the same fatty degeneration. Oil-globules are deposited in the transverse fibrous coat of the arteries, and in the corresponding coat of the veins. They may be seen, under the microscope, either as "minute, shining, black-edged particles, like molecules of oil, thinly and irregularly scattered beneath the outer surface of the small blood-vessels," or as globules of larger size, more closely packed together, or in round or oval clusters, "like large granule-cells." The subjoined engraving, from a paper by Mr. Paget, in the "London Medical Gazette," 1850, shows the appearance of a small artery under this form of degeneration.

Fig. 9.



351. The effect of this deposit of oil-globules is, that the even outline of the vessels is exchanged for a knotted appearance, and that their proper structures gradually waste and disappear, so that the smaller vessels dilate into minute aneurismal pouches. The proper vascular structure being thus weakened, lays the foundation of softening of the brain, or of that rupture of the vessels which constitutes one form of apoplexy.

352. Another variety of analogous formations consists in a deposit of a semi-cartilaginous matter from the free surface of the internal membrane of the arteries. The most common seats of this morbid secretion are the valves of the heart and aorta, the larger vessels at the points where they give off branches, and the smaller arteries through-

out their whole extent. Calcareous deposits, having the hardness of bone, are also of frequent occurrence in the heart and arteries as independent formations, that is to say, they take place where the structures have not previously undergone some other form of degeneration. The fibrinous deposits of greater or less consistence which attach themselves as *vegetations* to the lining membrane of the heart, more especially to that covering the valves, afford another familiar example of an *analogous* formation.

353. The interesting researches of Dr. Kirkes have recently attached a new and unexpected interest to these deposits on the valves of the heart. It appears that they occasionally become detached from the mitral valve, and being borne forward by the current of the circulation, are lodged in the middle cerebral artery or other artery of the brain, impede or stop the circulation, cut off the supply of blood to some portion of the brain, so as to cause the softening of that part, and, as a consequence, give rise to hemiplegia.

354. It will be seen, then, that deposits of fat, whether in the cellular membrane uniting the vessels of secreting organs and the membranes of arteries; or in the epithelial cells of secreting membranes; whether continuing in their original form, and encroaching gradually on the healthy structure of the organs which they attack, or becoming the seats of ulceration, or of calcareous deposits; play a most important part in the history of organic disease.

355. The proximate cause of these fatty deposits and degenerations may be inferred to be the imperfect oxygenation of the carbon contained in the venous blood. The fatty degeneration of the kidney, for instance, is of frequent occurrence both in men and in animals living in dark, filthy, and ill-ventilated places, where the air is unfit to support the process of combustion in all its vigour, at the same time that the constitution is enfeebled. Again, the fatty degeneration of the liver and kidneys, the atheromatous deposits in the coats of the arteries, and the fatty degeneration of the heart, are found in frequent combination in the spirit-drinker, who is constantly introducing into his system a large supply of a liquid hydro-carbon, both of whose gaseous elements attract the oxygen which ought to be devoted to the combustion of the carbonaceous matter derived from the food and from the effete textures of the body.

356. *Heterologous formations.*—These morbid growths may be subdivided into two classes—*non-malignant* and *malignant.* The first comprises *tubercle,* the second embraces the several forms of *cancer.* Tubercular diseases generally come under the care of the physician, malignant disorders fall more commonly under the hands of the surgeon. But both classes may occupy either the external or internal organs of the body.

357. *Non-malignant Diseases. Tubercle.*—This is a morbid sub-

stance deposited on the surface of membranes, or in the texture of organs. It consists of a peculiar unhealthy lymph, which presents itself in two different forms—the one whitish grey, semi-transparent, and dense; the other yellow, opaque, and friable. The first may be changed into the second, but the second is never transformed into the first. The grey tubercle is deposited in small isolated portions, as in the air-cells of the lungs, constituting miliary tubercles, or on the surface of serous membranes. The yellow variety is found in the same situations, as well as on the surface of mucous membranes, and in the substance of the several organs—in the follicles of the intestines, in lymphatic glands, in the liver, spleen, brain, uterus, &c. It assumes different forms according to its situation, sometimes being collected in a distinct mass, sometimes diffused through the tissues of an organ as a homogeneous cheesy matter. In some instances it is so thoroughly blended with the textures as to assume the very form of the organs attacked, which are then said to degenerate into it.

358. The chemical properties of this substance are not characteristic. It may be resolved into albumen, fibrin, gelatin, salts of soda and lime, and water, with a small quantity of fatty matter. Under the microscope *miliary* tubercle presents a granular appearance, the granules being blended with nucleated cells. The yellow variety also consists chiefly of granules, interspersed with minute spherules and irregular flakes and numerous oil-globules, and with a few perfect cells at the external border.

359. Tubercle is sometimes, though rarely, deposited before birth; is rarely met with before the fourth year; is frequent between the fourth and fifth; less frequent, again, from this time till puberty; most frequent of all between puberty and the age of fifty. The lungs are its most common seat, so that after the age of fifteen it is almost never met with in other organs without existing in them at the same time. The state of constitution (*tuberculous cachexy*) which leads to their deposition may be either inherited or acquired.

360. Tuberculous matter is at first deposited slowly, and without exciting pain or inconvenience, and may remain in a quiescent state for a very considerable period. At length, in consequence generally of a common cold, or slight febrile attack, the tubercle begins to act as a foreign body, and sets up inflammation in the surrounding tissues. When this change takes place in the lungs or in the substance of the absorbent glands, serum and pus are poured out, an abscess is formed, which slowly approaches the surface, and bursts, discharging the tubercle, softened and broken down by the effused fluids. After the discharge of its contents, the walls of the abscess generally contract and heal; but sometimes the tubercle is converted into a chalky or earthy matter, which may remain quiescent for the remainder of life. When the seat of the tuberculous deposit is the mucous membrane of the larynx or intestines, the membrane ulcerates.

361. Scrofulous subjects, besides being liable to tubercular deposits, are particularly subject to the chronic forms of inflammation, suppuration, and ulceration. The lymph effused, as the result of inflammatory action, is curdy, and wanting in consistence, the pus serous and flaky, and granulations, when formed, are large, pale, and flabby. Scrofulous children are very liable to pustular, scabby eruptions of the ears and mouth, which discharge a thin acrid matter. Scrofulous enlargement, inflammation, and suppuration of the absorbent glands, especially of the neck, and a similar affection of the mesenteric glands occasioning the disease known as tabes mesenterica, are also of common occurrence in childhood.

362. It has been shown experimentally that tubercular deposits may be produced at will in animals by confining them in dirty places, and feeding them on unwholesome food.

363. *Malignant Diseases.*—These heterologous formations resemble tubercle in affecting almost all the organs of the body, though exhibiting a preference for a particular class of structures; in being more or less frequently traceable to hereditary predisposition; and in their tendency to disintegration, and the consequent excitement of destructive inflammation of the parts affected. On the other hand, malignant growths are distinguished by their tendency to extend into surrounding textures, and, when inflammation has been set up, to progressively destroy them; by following the course of the absorbents and attacking the lymphatic glands; and by reappearing, after removal, in or near the cicatrix, or in some internal organ nearly connected, through the absorbent system, with the part first attacked. The true malignant growths may be all comprised under the general name of Carcinoma or Cancer.

364. *Carcinoma* (*Cancer*).—This term was originally applied to a malignant ulcer supposed to bear a resemblance to a crab (**καρκίνος**, cancer), but it now comprises many changes of structure which have little in common in their physical characters. Dr. Carswell divides carcinoma into two species, *scirrhoma* and *cephaloma.* The varieties of *scirrhoma* are scirrhous pancreatic sarcoma, tissu lardacé, matière colloide, cancer gelatiniforme; those of *cephaloma* are vascular sarcoma, and medullary sarcoma. According to Dr. Hodgkin, all these forms of carcinoma consist of compound cysts varying in their solid and fluid contents, growing from broad bases, or from narrow peduncles which, springing from a single spot, give to the tumour a radiated appearance: the smaller cysts are enveloped in a larger one. The various appearances presented by these tumours are due in great measure to the inflammation which takes place in them and in the surrounding textures, and to the entire or broken state of the several cysts themselves.

365. *Melanosis.*— This is an unorganized product, of a dark brown, dull bistre, or sooty-black colour. It is deposited in masses with or without cysts, or in patches on the surface of membranes. Sometimes

it is met with in small points, and occasionally it has been found liquid in accidental cavities. Its most frequent seat is the liver; but it is occasionally found in the eye, the skin, the brain, the lungs, the kidneys, and other glandular organs. Its chemical constituents are albumen, fibrin, and the salts usually found in the blood, with a colouring matter abounding in carbon. It is often found associated with other malignant growths, but is distinguished from them by the cells continuing free instead of being attached to the surrounding tissue.

366. Deposits of a black colouring matter are often found in the bronchial glands and on the surface of the lungs both before and after birth. Such deposits are not of a malignant character. It is also probable that malignant melanotic growths consist of this dark deposit blended with a true malignant structure.

4. THE NERVOUS SYSTEM.

367. The vital principle, which, in some shape or other, endows every part of the frame, and even the blood itself, with properties altogether different from those of unorganized matter, is more especially connected with the nervous system. The brain, as the organ of the mind, is the immediate source of volition, and the part to which all impressions on the nerves of sensation are ultimately referred; the spinal cord, a continuation of certain portions of the brain, is the immediate origin of the greater part of the nerves both of sensation and volition, and both together form the joint source from which all the nerves of sensation and voluntary motion arise, from which the mandates of the will are sent forth, and to which the intelligence of the senses is conveyed.

368. In addition to these important parts of the nervous system, there is a separate centre of nervous influence in the sympathetic, which connecting itself, in a manner little understood, with the nerves of motion and sensation, presides over the functions of those organs which are most essential to life, and is the cause of most of those movements which are independent of the will, of many of those sensations by which life is preserved, and of those chemical changes which are peculiar to organized beings. For the important movements of respiration, moreover, a peculiar set of nerves is provided.

369. But there is still another function, and a corresponding set of nerves, to which the attention of the profession has been strongly directed by Dr. Marshall Hall and Professor Müller,—the reflex function and the excito-motory system of nerves. There are certain parts of the body (chiefly the canals lined by mucous membrane, and especially their outlets), which, when irritated, excite contraction of the muscles subservient to the performance of their functions. Thus, if the lining membrane of the air passage is irritated, the respiratory muscles are thrown into violent action. Here there is no exercise of volition, and yet there is muscular contraction. Observations in cases

of paralysis attended with loss of sensation and voluntary motion, and experiments on decapitated animals, have further shown, that for the production of these effects it is not necessary that sensation or volition should be present. Hence it became necessary to suppose the existence of a separate set of nerves; one going from the skin, or mucous membrane, to the brain or spinal marrow; and the other, from the brain or spinal marrow to the muscles. The absence of common sensation and volition at once pointed to the spinal marrow, and not the brain, as the centre of union of these two sets of fibres; and what theory has pointed out as necessary, the scalpel, in the hands of Mr. Grainger, has shown to be true.

370. The following scheme, therefore, will represent the several orders of nerves, and the relations which they bear to the brain and spinal marrow.

(1.) The cerebral, or sentient and voluntary, of which the brain is the centre.

(2.) The true spinal, or excito-motory, of which the true spinal cord is the centre.

(3.) The ganglionic, or the nutrient, secretory, &c., of which the sympathetic forms the principal portion.

371. The first order of nerves comprises all the nerves of *sensation* (the olfactory, the optic, the auditory, the gustatory, and the nerves of touch), and all the nerves of voluntary motion. The common centre of all these nerves is the cerebrum and cerebellum. The greater part of the nerves of touch or common sensation may be said to unite with the greater part of the nerves of voluntary motion to form the external portions of the spinal marrow, and in this manner to communicate with the brain.

372. The second set consists also of two orders of nerves, of which, the one passes chiefly from the internal surfaces to the interior parts of the medulla oblongata and spinalis, and the other from those parts of the spinal cord to muscles having peculiar actions subservient chiefly to ingestion and egestion. Some fibres of the same order of nerves are probably distributed to other parts of the body, such as the skin and the muscles of voluntary motion.

373. That part of the spinal marrow to and from which these nerves run, has been called the *true* spinal marrow, in contradistinction to those parts of it which are formed by bundles of cerebral nerves. The motions due to this system are termed *excited.*

374. The third class of nerves, or the ganglionic, is divided by Dr. Marshall Hall into the *internal* ganglionic, or the sympathetic, including some few fibres of the pneumo-gastric; and the *external* ganglionic, embracing the fifth nerve and the posterior roots of the spinal nerves. These latter nerves are supposed to be chiefly destined for the nutrition of the external organs.

375. The functions corresponding to the several divisions of the nervous system, then, are:—1, sensation and voluntary motion; 2, excitements to action without sensation, and combined motions without will; and 3, nutrition, secretion, and the motions connected with them.

376. The nerves consist of minute fibres, enclosed in sheaths, distinct through their entire course, and terminating in the parts to which they are distributed, either by free isolated extremities, or by loops between every two fibres, or by a net-work, like blood-vessels.

377. Experiment has made us acquainted with the functions of the more important nerves of the body, but has left much yet to be discovered. It has also thrown light on the laws which govern the transmission of nervous influence, though it has left the nature of that influence involved in the same obscurity which hangs over the real essence of light, heat, or electricity.

378. The effect of the division of a nerve is well known. If the nerve be one of sensation, irritation of the branches or trunk of the nerve below the point of division causes no pain; if it be a nerve of voluntary motion, neither the will nor a stimulus applied to the nerve above the point of division can cause the muscle to which it is distributed to contract. On the other hand, if the voluntary nerve be irritated below the point of division or the sentient nerve above it, motion takes place in the one case, and sensation in the other; the sensation being referred to the parts supplied by the extremities of the nerve.

379. This law of sensation is strikingly illustrated in cases of amputation of an arm or a leg, where irritation of the divided extremity of the nerve is referred to the fingers or toes of the lost limb even for years after its removal.

380. A knowledge of the fact that irritation of the trunk of a sentient nerve produces pain, not in the trunk itself, but in the parts to which its branches are distributed, is of constant application in the treatment of disease, and tends to destroy our confidence in the division of nerves as a remedy for pains in the parts which they supply. The failure of this remedy in several cases of tic-douloureux has been satisfactorily explained by the discovery of some cause of irritation, as a tumour or spicula of bone, at the origin of the nerve.

381. Although pressure applied to a sentient nerve causes pain in the parts supplied by its branches, a still stronger pressure produces pain in the trunk of the nerve itself. Severe local injury to a nerve of sensation or voluntary motion destroys its power as a conductor of nervous influence, but it affects the nerve itself only locally; for irritation of that portion of the uninjured sensitive nerve which is in connexion with the brain, produces sensation, and irritation of that portion of the nerve of volition in connexion with the muscles causes muscular contraction. When, however, a nerve of motion is stretched violently through its whole length, it loses its property of exciting

muscular contractions, and sometimes the muscle itself loses its irritability, and cannot be made to contract by any stimulus, however powerful.

382. Experiments on animals have brought to light some properties of the nerves, which may be advantageously borne in mind by the pathologist. In the first place, it has been proved beyond a doubt, that all stimulants applied to the nerves in the dead body act in nearly the same way, and produce effects differing merely in degree. Of such stimulants, the electric and galvanic fluids are the most effectual, and they have been accordingly employed in almost all experiments on the properties of the nerves. These experiments have shown, that the nerves, when stimulated by galvanism, do not act as mere conductors of the galvanic fluid, for the muscles contract when the galvanic current is made to pass transversely through the nerve; and the muscles cannot be made to contract by any degree of mechanical irritation applied to a nerve of sensation, whilst the slightest irritation of a nerve of motion gives rise to very strong contractions of the muscles. Hence, then, it appears that there resides in the nerves themselves a property of exciting muscular contractions on the application of stimuli, independent of the brain and spinal cord. It has been further shown, that this property may be exhausted by the continued application of a stimulus, and that it returns after an interval of rest.

383. These experiments on the bodies of animals have been corroborated by others made during life on the human subject; and it has been satisfactorily proved, not only that all stimuli, whether mechanical, chemical, or electrical, act in the same way, but that they all cause the several nerves to which they are applied to manifest the characteristic properties with which they are endowed. Thus, irritation of nerves of common sensation causes pain; of nerves of motion, muscular contraction; of the retina, the sensation of light; of the auditory nerve, that of sound; of the origin of the pneumo-gastric nerve, a derangement of the digestive process manifested by the elimination of sugar from the kidney. The stimulus of galvanism, too, excites in each organ of sense the sensation proper to it—taste in the tongue, a peculiar smell in the nose, light in the eye, a musical sound in the ear.

384. Some of the stimulants which have been mentioned admit of application in disease. Of these, heat, cold, and electricity are the most important. Both heat and cold cause the muscles to contract, and both in excess destroy the irritability of the muscles. Cold water injected into an artery causes contraction in the muscle which it supplies; and this fact has been taken advantage of in cases of uterine hæmorrhage after delivery, by injecting cold water into the vessels of the still-adhering placenta. The efficacy of cold applied externally or internally, especially if its application be sudden, in causing contraction of the uterus is well known. The good effects of electricity

and galvanism in exciting muscular contractions is manifested in some cases of paralysis.

385. The nervous power which after death is exhausted by the continued application of stimuli, is exhausted also in the living body, and in both cases rest is required for its restoration. The effects of this exhaustion on the entire frame are repaired by sleep; in parts of the body by repose, or change of action, which is but a form of repose.

386. The effects produced in nerves of sensation or motion by the application of stimuli, are very remarkable. If the stimulus be very powerful, it may entirely destroy the excitability of the nerve, though applied only momentarily, as in the case of a flash of lightning producing permanent blindness. The same stimulus may at once annihilate the nervous power of the brain and spinal cord, and produce sudden death. Permanent paralysis may arise from the same cause. A weaker stimulus applied for a longer time may produce the same effect. Snow blindness, from the continued strong reflection of light on the retina, is an illustration in point: the paralysis of the muscles which sometimes follows violent and long-continued exercise is another example of the same kind.

387. Still weaker stimuli, or the same stimuli applied for a shorter period, exhaust the excitability of the nerve, and cause fatigue. Thus, if we gaze for a long time at the same colour, the eye becomes fatigued and insensible to the impression of that colour; if we keep the same muscles in action only for a few minutes, as when we hold the arm extended, we feel extreme fatigue. The same result follows if we continue standing in the same position; but the slightest change of posture affords instantaneous relief.

388. Extreme exhaustion of the nervous power is always accompanied by severe pain. Thus, after the long-continued application of the stimulus of light to the eye, the sensibility of the retina is so increased, that even a feeble light produces intense pain, and the stimulus of extreme cold or heat applied to the skin gives rise to acute suffering. In like manner the long-continued action of the muscles, as in walking, produces the most excruciating agony.

389. The application of stimuli, then, to the nerves of sensation or voluntary motion, produces, according to its degree and duration, entire destruction of the nervous power, or great exhaustion of it, accompanied in extreme cases by severe suffering; and the functions of the nerves are not restored till after an interval of rest proportioned to the degree of the previous exhaustion. Experiment has shown that the brain and spinal cord are the sources whence the restorative influence emanates, and that nerves which have been permanently cut off from those centres lose their property of exciting the muscles to contraction.

390. As all stimuli applied to the nerves produce more or less exhaustion of the nervous excitability, it follows that no medicine acting as

a stimulus can strengthen the nervous energy. But there is a class of remedies which have the opposite effect, viz., that of deadening the excitability of the nerves, and, if applied in a concentrated form, of entirely destroying it: these are the *narcotics*. This has been proved both by experiments on animals, and by observations on the human subject. If, for instance, the ischiatic nerve of a frog be dissected, and allowed to hang in a solution of opium or morphia, it is entirely deprived of its power of exciting muscular contraction. This, however, does not extend beyond the portion of the nerve to which the narcotic is applied.

391. Paralysis of the voluntary muscles produced by placing the leg of a frog in a solution of opium, or of hydrocyanic acid; of the heart, by the application of infusions of opium and tobacco; of the intestines, by opium and ticunas (all of which effects have been observed in the experiments of Monro, Coullon, Wilson Philip, and Morgan and Addison), are instances of the same kind. Similar local effects are produced in the human body, as evidenced by the loss of contractile power in the iris from the local application of extract of belladonna, by the paralysis of the muscles of the hands caused by the handling of lead, by the loss of sensibility in the lips and tongue occasioned by chewing monkshood, and in the fingers by the vapours of strong hydrocyanic acid.

392. Such is the local effect of narcotic poisons on the nerves. The modus operandi of narcotic poisons taken into the stomach, or otherwise introduced into the system, is a point of great interest in physiology, and of practical importance in the treatment of disease. It has been already shown that poisons, however they may be introduced into the system, enter the circulation, and of course are brought into close contact with the nerves; this, then, is but another form of local application, and must be followed by local effects. But as the whole nervous system would in this way be brought under the influence of the poison, no local effects would be perceived unless the poison had a specific action on some one part of the body. The fact of such local action occurring has been placed beyond a doubt by experiments on animals. Thus, Müller having divided all the vessels and muscles of the thigh of a frog, poisoned the animal with nux vomica, and found that the irritability of the sound leg was lost much sooner than that of the leg of which the vessels and muscles had been divided. This loss of irritability in the sound leg could be attributed to no other cause than the circulation through it of blood containing the poison, and the consequent local effect of the poison on its nerves.

393. But though the local action of poisons on the nerves is thus established, it is evident that such local action can only produce dangerous or fatal effects by acting on the more important organs of the body, viz., the brain and spinal marrow, the heart or the lungs; and as these organs would all be locally affected by the poison, it is unnecessary to seek for the cause of death in the local effect produced on

parts of less importance to the economy. We may safely assume, then, that poisons prove fatal by their action on one of these three organs; and the experiments of Mr. Blake, already referred to, prove that it is in consequence of their being conveyed to those organs by the vessels with which they are supplied.

394. Another fact which has been proved by experiment is, that those poisons which excite strong muscular contractions, produce their effects through the circulation, and not by immediate application to the nerves themselves. Thus, strychnine applied in powder to the moist spinal cord of the frog, excites no twitchings of the muscles; in order to do so, it must first enter the circulation. So, also, when an animal is poisoned with opium or strychnine, if the nerves of the extremity are divided, the spasms in that limb cease; and if the spinal marrow is cut through before an animal is poisoned with upas or angustura, the parts supplied by the nerves coming from the lower portion of the cord are not convulsed. These experiments prove that the poisons in question do not excite contractions of the muscles by their direct action on the nerves but through the medium of the spinal cord and brain. The general symptoms of poisoning, therefore, may be safely attributed to the action of the blood, tainted with the deleterious substance, on one or other of the important organs of the economy. Thus urea, which accumulates in the blood in consequence of the loss of power in the kidneys to eliminate it, acts on the brain, and proves fatal by inducing coma.

395. The foregoing observations apply chiefly to the nerves of sensation and voluntary motion, which have the brain and certain portions of the spinal cord for their origin and centre. There yet remain to be examined, as of great importance to the physician, the functions of the sympathetic nerve and of the excito-motory system of nerves.

396. *The Sympathetic.*—The functions of this nerve are threefold; it presides over the involuntary motions of the more important viscera of the body; it is the medium by which all impressions are conveyed from those parts to the central organs; and it regulates the process of secretion and of nutrition in every part of the frame.

397. With regard to the first property of the sympathetic—that of presiding over the involuntary motions of the important viscera—it has been ascertained by experiment that the parts which this nerve supplies, as the heart, the intestinal canal, &c., continue to move long after they are separated from their connexion with the rest of the sympathetic system, and even after their removal from the body, and that the contractility of these parts is preserved longer than that of the voluntary muscles. The effects of stimuli applied to the sympathetic nerve are also of longer continuance than those of stimuli applied to the nerves of voluntary motion; and the motions thus excited are either rhythmic, as in the beats of the heart, or continuous, as in the peristaltic movements of the intestines.

398. All the parts supplied with nerves from the sympathetic are, to a certain extent, independent of the brain and spinal marrow. Thus, the heart will continue to beat long after the division of its nerves, after severe injury of the brain and spinal cord, and even after its entire removal from the body. That the spinal cord, however, does influence the contractions of the heart has been proved experimentally; and that the brain affects them is shown by the familiar effect of mental emotions upon them. On the other hand, when the mind is tranquil, the heart's contractions are few, and in sleep they fall much below the number during our waking hours. There is good reason also to believe that, as the parts supplied by the sympathetic are strongly affected by influences emanating from the brain and spinal cord, so the sympathetic is dependent for its supply of nervous power upon those centres.

399. The impression made on the nervous fibres of the sympathetic are not usually conveyed to the brain; in other words, they are not of the nature of sensations; but violent causes of irritation may give rise to sensation, either in the parts supplied by nerves from the sympathetic, as in enteritis, or in those supplied by cerebro-spinal nerves. When the cerebro-spinal nerves are the seat of the irritation, the painful sensations are usually experienced in the extreme parts of the organs affected: thus, we have itching of the nose and anus from the irritation of worms in the intestines, and pain and itching in the glans penis from disease of the kidneys and bladder. These are examples of pain reflected from the sentient nerves of the spinal cord; but irritation in the intestines, or a disordered condition of the uterine functions, are familiar causes of reflected sensations of a still more marked character, such as the acute pains in the muscles of the chest and abdomen occurring in hysterical females, accompanied by tenderness of the spine itself, and sometimes removed by remedies applied to that part.

400. The same irritation conveyed to the spinal marrow, and accompanied by tenderness there, may be reflected from the same parts on the nerves of voluntary motion, giving rise to a long train of spasmodic diseases: such as convulsions, chorea, and tetanus, in children from intestinal irritation; hysteria affecting the muscles of voluntary motion, but especially those of respiration, arising in adults from the same cause; vomiting and hiccup from irritation of the intestines, kidneys, or uterus.

401. The sympathetic nerve has been shown to preside over secretion and nutrition, and consequently over the functions of the parts concerned in these important processes: the capillary vessels, therefore, and the arterial system generally, fall under its influence. Of these, the organic functions of the sympathetic, and of the degree in which they are dependent upon the brain and spinal cord, less is known than of its other properties. There is reason, however, to believe that the sensations of cerebro-spinal nerves are reflected from the spinal marrow on parts supplied by nerves from the sympathetic. Thus syncope may occur from impressions on sentient nerves.

402. Instances of the reflected action of the organic nervous fibres of one part on those of another are very numerous. Thus inflammation of the testicle may be replaced by that of the parotid gland; erysipelatous inflammation of the skin by that of the brain; gouty inflammation of an extremity by a similar inflammation of an internal organ; rheumatic affections of a joint by that of the heart. So, also, with secretions: the secretion of the skin, for instance, may be replaced by that of the kidney. In this case, perhaps, the effect is less exclusively due to nervous influence than in the former.

403. The suppression of habitual secretions, whether natural or acquired, gives rise to similar reflex actions of the organic nerves. The suppression of the menstrual discharge, for instance, is sometimes followed by a periodical discharge of blood from the lungs, which scarcely admits of any other interpretation than the one now assigned. The suppression of an hæmorrhoidal discharge may give rise to apoplexy, and the drying up of an ulcer to a similar disease of a distant part. These latter cases, however, admit of explanation on the supposition that a temporary state of plethora is produced, which finds relief in the part most predisposed to take on diseased action. It is probable that all cases of metastasis are partly due to a reflex action of the organic nerves, partly to the quantity and quality of the circulating fluid, and partly to the predisposition of the several organs to take on diseased action.

404. In speaking of the phenomena of inflammation (§ 334, et seq.) certain changes in the size of the small vessels were attributed to nervous influence. The enlargement of the small arteries in blushing, and their contraction from the emotion of fear, were shown to be independent of increased action of the heart, and to be strictly local phenomena. It was also shown that these changes in their calibre can be attributed to nothing else than a modification of their contractility, and this modification itself was attributed with equal reason to nervous influence.

405 Assuming this explanation to be correct, it is obvious that it must apply with equal force to the larger arteries; and this is rendered highly probable by the peculiar character of the pulse which accompanies the first stage of severe febrile and inflammatory affections; a character strongly marked, and furnishing an evidence of the real state of the vessels, almost as complete as the visible redness of the surface in cases of inflammation does of enlargement of the capillary vessels. The pulse here spoken of is distinct from that of health, and from that present in the after stages of these affections; it is present with the first feeling of indisposition, and continues till the characteristic marks of the disease have made their appearance. It is a frequent, full, weak, and compressible pulse, conveying to the finger the most distinct impression of a relaxed and flabby coat, and readily explained by the loss of contractility already spoken of. In the indisposition which ushers in attacks of scarlet fever, erysipelas, cynanche

tonsillaris, &c., it is always present, and always very distinct in its character. On the strength of this symptom alone, the strong analogy of the small vessels may be extended to the larger arteries, and it may be confidently stated that there is one state of system, at least, in which the larger vessels undergo the same change as the smaller branches in inflammation.

406. Is not this condition due to some change in the state of the organic nerves supplying the coats of the blood-vessels? Does not that change consist in a withdrawal of the nervous influence from the vessels? And is not a diminution of nervous power the direct effect of the poison which is the cause of these diseases?

407. On the other hand, in certain cases, as in ague, may not this same state of the larger vessels follow upon an increased action of the vessels of the entire system; that is to say, upon a temporary increase of their contractility, just as in inflammation a dilated state of the capillary vessels follows upon the contraction produced by the application of a stimulus? In the general, as in the local affection, may we not have first the application of a stimulus, accompanied by an increase of nervous influence and consequent contraction of vessels, and then, as the necessary consequence, diminished nervous influence, and relaxation of vessels? This increased contractility of the extreme vessels is the *spasm*, which plays so prominent a part in Cullen's theory of fever. *Spasm* of the small vessels is a state of short continuance, not overcome by a reaction in the centre of the circulating system, but yielding to that diminished contractility which follows as certainly upon increased action as blunted sensibility upon over-exertion of the organs of sense, and fatigue upon long-continued or violent action of the muscles. This is theory, and as such is introduced here, with some fear that it may be thought out of place.

408. The sympathetic nerve, as the name implies, is assumed to be the organ of many of those combined sensations, motions, and secretions, which have received the name of *sympathies*. The discovery of the reflex system of nerves has traced some of these to a different source; but from whatever cause they arise, they well deserve the attention of the physician.

409. The different parts of the same tissue are said to sympathize with each other; thus, in catarrh, inflammation is readily communicated from one part of the mucous membranes to another; inflammation of one serous membrane is sometimes followed by that of another, as peritonitis by pleuritis; gouty or rheumatic inflammation of the fibrous tissues of a joint by the same inflammation of the same tissue in the heart; inflammation of one tract of absorbent vessels by that of the glands through which they pass; and inflammation of the veins of the uterus by that of the same vessels in other parts of the body.

410. Different tissues are also said to sympathize with each other, but this happens more rarely. Sometimes, for instance, an inflammation commencing in the mucous membrane of the intestine extends

to the muscular, and thence to the peritonæal, coat; so also, severe inflammation of the muscles of the side (Pleurodyne) may extend to the pleura. The sympathy between the skin and mucous membranes is familiar to every observer. The viscera and their investments likewise sympathize with each other. Thus, disease of the substance of the lungs, heart, liver, kidney, uterus, ovaries, or testicle, is often accompanied by more or less acute inflammation of the serous membrane which covers them.

411. The sympathies of entire organs with each other are still more important. These may be classed as follows:* 1. Sympathies between organs which have similar structure and function; as between the salivary glands, between the heart and blood-vessels, between the stomach and intestines, and between the several parts of the nervous system. 2. Sympathies between organs of different texture, but belonging to the same system: as the chylopoietic, the uropoietic, the generative, the respiratory system, and the united respiratory and circulating system—viz., the lungs and heart. 3. Sympathies of the more important viscera with the central organs of the nervous system: as in the affection of the brain which follows intestinal irritation in children, and the affections of the stomach attending injuries of the brain. 4. Sympathies between organs not connected in any of the foregoing ways, and only to be explained on the principles of reflection: such are the sympathy of the parotid gland and testicle; of the mamma and uterus; of the larynx, the respiratory organs, and the glands which secrete the hair, with the parts of generation.

412. In all these sympathies the nerves play an important part; but the several parts of the nervous system also sympathise with each other. Thus, the nerves of the surface and the central organs of the nervous system react upon each other; the affection of the central organs in fever causing the various conditions of the skin; and shocks of different kinds applied to the skin exciting the brain and spinal cord. Thus, cold water poured on the head, restores the brain exhausted by long-continued inflammation, and dashed in the face or thrown on the chest, removes an hysterical fit, excites the nervous centres in cases of narcotic poisoning, restores persons in the state of syncope, and is among the most efficacious remedies in asphyxia. In all these cases the central organs are roused into activity by the shock applied to the surface.

413. The sensitive nerves sympathize with sensitive, the motor with motor, and the sensitive and motor with each other. The optic, the olfactory, the auditory, and the ciliary nerves of the two sides are affected at the same time and in the same way, and an affection of the one side often leads to a similar affection of the other: thus inflammation of one eye is often followed by inflammation of the other; deafness of one ear by deafness of the other; alterations in the size of one pupil by a similar alteration in the size of the other. This

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* See Müller, vol i., p. 812.

sympathy between nerves of sensation extends also to nerves of different kinds and functions: thus, a strong light on the eye produces tickling in the nose; tickling the feet throws the whole body into convulsions; certain sounds put the teeth on edge; a tumor on a nerve may produce pain or spasms in parts of the body in no way connected with it. To phenomena of this kind the term *radiation of sensations* has been applied. Sympathies of motor nerves with each other occur in all associated movements. Those of motor with sensitive nerves belong to the class of excited or reflected motions. To the same class belong the important phenomena of associated movements excited by nerves which do not convey sensation. A very considerable part of the motions which take place independent of the will may be safely referred to this head.

414. The following plan will exhibit the extent and importance of that system to which the name of excito-motory has been given:—

Incident motor branches.	*Reflex motor branches.*	*Excited actions.*
I. Trifacial, arising from		
a. The eye-lashes. *b.* The alæ nasi.	The trochlearis The abducens } oculi.	Protective and other movements of the eyes and eyelids.
c. The nostrils.	Minor portion of the fifth.	Of the iris?
d. The fauces. *e.* The face.	Orbicularis Levator alæ nasi } from the facial.	(Facial respiratory movements,) Sneezing, laughing, &c., &c.
II. The Pneumo-gastric from		
a. The pharynx.	The pharyngeal.	Of the pharynx, { In ingestion of food, suction, deglutition, &c.
b. The larynx.	The laryngeal.	Larynx, { Closure of glottis, &c.
c. The bronchia.	The bronchial, &c.	Motions of the air-passages in respiration.
d. The cardia, kidney, and liver.	The œsophageal and cardiac.	Motion of the œsophagus and stomach in digestion.
III. The glosso-pharyngeal.	The myo-glossal.	Associated movements of tongue and pharynx.
IV. The posterior spinal from		
a. The general surface.	The spinal accessory.	Movements of the muscles of respiration.
b. The glans penis and clitoridis.	Diaphragmatic, Intercostal, Abdominal, } from the spinal.	Expulsion of fæces, urine, and semen, and of the fœtus in parturition.
c. The anus. *d.* The cervix vesicæ. *e.* The cervix uteri.	The sphincters, the expulsors, the ejaculators, the Fallopian tubes, the uterus, &c. } from the sacral.	Retentive movements of the sphincters—viz., of the cardia, of the valvula coli? of the sphincter ani, sphincter vesicæ, (neck of uterus?) and vesiculæ seminales?

Tone and irritability of the muscular system.

415. The first two columns of the foregoing table are taken, with slight alterations, from Dr. Marshall Hall's work "On the Diseases and Derangements of the Nervous System;" the third column is added from a subsequent table, showing the physiology of the true spinal system, with many transpositions and some additions, the excited actions being placed opposite to those divisions of the first two columns with which they have the most obvious connexion. The excited actions in the third column are not produced by irritation of the incident nerves of the first, but correspond more closely with the excited action of the reflex motor branches of the second column. Thus, the incident motor branches of the nostrils, when irritated, will produce not merely the facial respiratory movements, but will also throw the muscles of respiration into violent action. So likewise irritation of the bronchial incident nerves will excite not merely the muscular fibres of the bronchial tubes, but the muscles of expiration also in the act of coughing.

416. The following table presents the pathology of the true spinal system, according to Dr. Marshall Hall:—

PATHOLOGY OF THE TRUE SPINAL SYSTEM.

Diseases of the Incident nerves.

I. Dental Gastric Intestinal	Irritation in Infants.	1. Crowing inspiration. 2. Strabismus, spasm of the fingers and toes, strangury, tenesmus, &c. 3. Convulsions. 4. Paralysis.
II. Gastric Intestinal Uterine	Irritation in Adults.	1. Hysteria. 2. Asthma. 3. Vomiting, hiccup, &c. 4. Epilepsy. 5. Puerperal convulsions, &c.

III. Traumatic tetanus, hydrophobia, &c.

Diseases of the reflex or motor nerves.

I. SPASM.
- *a.* Spasmodic tic.
- *b.* Torticollis.
- *c.* Contracted limbs, &c.

II. PARALYSIS.

Diseases of the spinal marrow itself.

I. Inflammation and other diseases.
II. Diseases of the vertebræ and membranes.
III. Counter pressure, &c., in diseases within the cranium.
IV. Centric epilepsy, tetanus, &c.
V. Convulsions from loss of blood, &c.

417. The condition of the nervous system and that of other functions of the body reciprocally affect each other; but this mutual dependence is so strikingly displayed in the case of the circulation and the nervous centres, as to merit a separate consideration in this place.

418. The effect of the emotions and passions, and of all violent exertions of the body, on the heart, is a matter of daily observation; and so surely does the circulation participate in every change of the nervous system, that it becomes the best test of the degree and amount of that change. Every violent exertion of different muscles, and every long-continued exercise of the same muscles, strongly excites the pulse; and rest not only restores it to the frequency which it had before the effort, but for a time reduces it below that number. The various causes of excitement to which the body is exposed during its waking hours, affect the circulation in the same way. It is in consequence of the fatigue produced by these causes that the pulse falls towards evening, and regains its frequency when the body has been refreshed by sleep. Precisely the same effects are produced by disease. In febrile affections, for instance, the pulse during the height of the disorder is much more frequent than in health, but as soon as the disease has passed away, the pulse falls many beats below its natural frequency, to regain that frequency again as health and strength return.

419. Another remarkable fact established by careful observation of the pulse is, that the body is much more affected by all causes of excitement when it is in full possession of its strength, than when it is exhausted by fatigue. Thus all stimuli—muscular exertion, food, drink, and even mental application—produce a much greater effect on the circulation in the morning than at night, and not only a greater effect, but one of much longer continuance. So, also, if two persons be submitted to the same stimulus, the pulse of the stronger will be most affected by it; if a healthy man, and one just convalescent from fever and free from local disease, take the same food, the circulation of the healthy man will be most accelerated.

420. But there are states of debility in which the heart's action, in place of being less frequent, is more frequent than in health. This occurs in a more advanced stage of convalescence, when the patient begins to recover his strength, and also in the decline of febrile affections, so long as any degree of fever continues. In this state, stimulants have the effect of lowering the pulse; the action of stimulants, therefore, becomes a useful test of the condition of the patient. A greater degree of debility in the absence of actual disease is characterised by a very small and very frequent pulse; but such debility is rarely met with, except as the consequence of diminution in the quantity of the circulating fluid, whether from excessive loss of blood or from increased discharges.

421. When exhaustion of the nervous power is accompanied by local disease, whether functional or structural, that state of system exists to which the name of *irritation* is given. Irritation is observed in cases of slow convalescence from fever, in which some local affection has supervened; as an immediate consequence of severe injuries in

subjects debilitated by previous disease or bad habits of life; and as a more remote consequence in sound constitutions. In these latter cases, the injury itself produces the same nervous exhaustion which bad habits or previous disease had occasioned in the former.

422. Another example of the effect of the nervous system on the circulation is *syncope*. This, which consists in a temporary arrest of the heart's action, may be caused by any violent shock sustained by the nervous centres, originating from without, as in accidents, or within the brain itself, as in the case of fainting from violent emotions. Sometimes the heart is paralysed by the shock, and death is the result.

423. There is still one other mode in which the nervous centres act upon the circulation. When blood or serum is effused upon the brain, the heart is remotely affected, and the same result follows a similar injury to the upper portion of the spinal cord. In these cases, the heart beats less frequently than in health. The heart is also affected in the same way in some cases of hysteria. Here the cause is more obscure.

424. The effect produced upon the nervous centres by changes in the state of the circulation is more important even than those which the circulation suffers from alterations in the state of the nervous system. The exhaustion which follows on strong nervous excitement has its counterpart in the exhaustion produced by loss of blood. The sudden loss of a large quantity of blood produces syncope or death, partly by depriving the heart of its due amount of stimulus, and partly by paralysing the nervous centres. The abstraction of a small quantity may give rise to the same state of debility which follows upon febrile affections, but this can only take place where the frame is quite free from local disease, whether functional or structural.

425. When the loss of blood is occasioned by a severe wound, or occurs in a person affected with local disease, or of a broken constitution, the debility is accompanied by some nervous excitement, and *irritation* is the consequence. The same effect follows when the quantity of the circulating fluid is diminished by profuse discharges, such as leucorrhœa, or diarrhœa. In all these cases there is some local affection—in the case of the wound, inflammation and its consequences; in the case of the broken constitution, some visceral disease; in leucorrhœa, diarrhœa, &c., some local disturbance—and in all these cases the state of debility is exchanged for that of irritation. An excessive and continued drain of natural secretions, as in menorrhagia, and in prolonged suckling, leads to the same result. The puerperal state, combining, as it does, nervous exhaustion, loss of blood, a local affection, and a sudden change of the equilibrium of the fluids, presents the most vivid picture of that state to which the name of irritation has been given.

426. In this condition of irritation, as in that originating in the

nervous centres themselves, we have the frequent and quick pulse easily excited by mental emotion or by strong and sudden impressions on the organs of sense, and this is accompanied by a great variety of nervous affections. The functions of the brain itself suffer; and we have, according to the degree of the irritation, mental excitement, delirium, or mania; the nervous influence conveyed to the muscular system betrays the same derangement under the forms of restlessness, jactitation, convulsions, and spasms in the voluntary muscles, and frequent or irregular breathing, laughing, crying, sighing, sobbing, and yawning, in the muscles of respiration; the nerves of sensation, participating in the general derangement of the nervous system, may become unusually acute, giving rise to an intolerance of light and sound, an excessive sensibility of surface, and acute reflected pains in the walls of the chest and abdomen. The stomach likewise sympathizes with the nervous centres, and there is nausea, vomiting, and hiccup.

427. Such are some of the phenomena of the state of irritation—a state which, whether it originates in the nervous system, or in the circulation, displays nearly the same character, and requires the same treatment. It is aggravated by depletion, and relieved by those remedies which impart strength whilst they soothe excitement. A combination of narcotics and tonics, or of narcotics and stimulants when the debility is extreme, and the nervous symptoms urgent, is the remedy indicated, and opium fulfils this indication better than any other.

428. The influence of the nervous system over muscular movements has already been alluded to; and two classes of movements have been described, the involuntary and the voluntary; the former excited by certain changes in the condition of the incident or excitor nerves giving rise to corresponding changes in the reflex or motor nerves, and the latter by the will. In health these two sets of muscles execute their appropriate movements; in disease, or in peculiar states of system, the one takes on the character of the other, the involuntary muscles obeying voluntary impulses, and the voluntary muscles performing involuntary contractions.

429. A well-authenticated example of involuntary muscle being subject to the influence of the will, occurred in the case of Colonel Townsend, who possessed the extraordinary faculty of stopping the beat of his heart at will. In one or two other instances the same power seems to have existed. But examples of the voluntary muscles being subject to other influences besides those of the will, are both numerous and varied. The associated reflex movements of voluntary muscles produced by an influence transmitted from the peripheral extremity of an incident nerve to the spinal marrow, have already been mentioned.

430. Some of the most striking examples of involuntary actions of voluntary muscles observed in disease, are, chorea, hysteria, epilepsy, catalepsy, convulsions, tetanus, hydrophobia. Of these diseases, some

depend on a direct influence transmitted from the nervous centres, but the majority are examples of a reflex action.

431. When the contractions continue in the same muscles for a certain space of time, producing a fixed and rigid state of the parts affected, they are said to be *tonic;* when the muscles are alternately contracted and relaxed, they are called *clonic.* Tetanus, hydrophobia, and catalepsy are examples of *tonic* spasm; chorea, hysteria, and epilepsy are forms of *clonic* spasm; convulsions are sometimes of one kind and sometimes of the other.

432. In chorea and hysteria, voluntary and involuntary impulses are strangely blended; but the degree of control which the will exercises is widely different in the two cases. When a patient affected with chorea wills a movement, the involuntary action, mixing with the voluntary effort, causes grotesque distortions, and attempts at restraint only increase the action of the muscles; but the movements of the hysteric patient are less grotesque, though more violent, and can often be restrained by a strong effort of the will.

433. Convulsions afford an example of unmixed involuntary contraction. They are commonly a form of reflex action; but when they follow the loss of blood, there is reason to believe thet they arise from the sudden removal of that nervous influence which maintains the tone and the equilibrium of the muscles. As soon as this is withdrawn, the flexors, which are the strongest, contract, and the extensors, being put on the stretch, are in their turn brought into motion, and thus an alternate or clonic contraction of the two sets of muscles takes place: but as there is a balance of strength in favour of the flexor muscles, they at length overpower the extensors, and if death ensue, the fingers and toes are found flexed.

434. Convulsions, therefore, are often the last movements of a living body; they are also the most efficient cause of restoration from syncope; for when the circulation has nearly ceased, and the heart does not receive blood enough to excite it to action, the contraction of the muscles of the limbs forces the blood of the veins towards the heart, and thus tends to re-establish the circulation. The trembling of the limbs from cold, which is a low degree of convulsion, has the same beneficial effect in restoring the circulation of the blood.

435. The nerves of sensation, like those of voluntary motion, are subject to various derangements. Sensation may be lost (anæsthesia), or exalted (hyperæsthesia), or perverted (dysæsthesia). The loss of sensation which sometimes accompanies paralysis of the voluntary muscles is an example of anæsthesia affecting the nerves of touch; and amaurosis, of anæsthesia of the optic nerve. Intolerance of light and sound, and violent hunger and thirst, are examples of hyperæsthesia. The strange pains and anomalous sensations of hysteria and hypochondriasis, are instances of dysæsthesia. In some hysteric females there appears to be diminished sensibility of the nerves of

touch, with increased sensibility of other nerves, the sensibility appearing to be withdrawn from the one to be concentrated in the other. Hence some of the most remarkable phenomena of nervous affections, and of that state induced by the manipulations of the magnetiser.

436. There still remain to be considered two functions closely dependent upon the nerves, though connected more or less with the changes which are constantly taking place in the fluids and textures of the frame:—the generation of heat and electricity.

437. *Animal heat.*—The cause of animal heat is still a subject of controversy, but the experiments of Depretz and Dulong, as recently interpreted by Liebig, have rendered it in the very highest degree probable that the production of animal heat is entirely due to the combination of the carbon and hydrogen of the blood with the oxygen of the air in the process of respiration. It has also been shown experimentally, that the nerves exercise an important influence upon the temperature of the body. Though the precise effect which each of these causes has in the production of animal heat has not been determined, observation has shown that its amount varies greatly in different states of the system.

438. The temperature of those internal parts of the body which are most accessible—viz., the mouth and rectum, is about 97½ or 98½ Fahr. A difference, however, has been observed to exist in parts near to and remote from the centre of the circulation; thus, Dr. J. Davy observed, that the temperature of the axilla being 98° F., that of the loins was 96½°, that of the thigh 94°, that of the leg 93° to 91°, and that of the sole of the foot 90°. The temperature of the blood was about 101°.

439. In disease, remarkable deviations from the standard temperature have been observed both in excess and in defect. Thus, the temperature of inflamed parts has been found as high as 105° to 107°, and that of the whole surface has reached the same degree in some cases of fever, and risen still higher (to 112°) in scarlatina. On the other hand, in cases of morbus cæruleus and in the cholera, the temperature has been observed as low as 77½° or 77°. In most cases of disease, the increase and decrease of temperature bear a pretty exact proportion to the rapidity or slowness of the circulation; but remarkable exceptions to this rule have been observed. Thus, Dr. Hastings, in his work on inflammation, states that in several cases of fever the pulse has been remarkably infrequent, whilst the temperature has been very high; the pulse, for instance, being 45 when the temperature of the body was 105°. In cases of hydrocephalus, the same observer has counted a pulse of 60° or 70°, with a temperature of 100°.

440. *Electricity.*—The facts ascertained with regard to free electricity in man are the following:—As a general rule the electricity is

positive, but in the female more frequently negative than in the male; it is more abundant in persons of a sanguine temperament than in the lymphatic, greater in the evening than in the morning; greater when the temperature of the body is high than when it is low; it is increased by spirituous liquors, and reduced to zero in rheumatic affections. The free electricity of the body is generally of very feeble intensity, but in peculiar states of system the body has given out sparks in great abundance.

5. THE MIND CONSIDERED MORE ESPECIALLY IN ITS RELATION TO THE BODY.

441. The mind, acting through the brain as its instrument, exercises an important influence on the body. Some of the modes in which this influence is displayed have already been alluded to. It only remains to present the subject in a more connected form.

442. In speaking of the nervous system, two classes of nerves have been described—those of sensation and those of voluntary motion. To these correspond two orders of mental faculties, the intellectual and the affective. Sensation, perception, thought, judgment, imagination, are operations of the intellect. Love, fear, hope, ambition, pride, vanity, belong to the passions or emotions. A law of association governs both, and each is subject to the influence of habit.

443. As the intellectual faculties become possessed of the materials of thought solely through the senses, it is upon the senses that they react; but as the emotions and passions aim at their own gratification through the agency of the will on the voluntary muscles, or prompt to action as an escape from threatened evil, it is in them that they display their power. Hence the influence of the intellect on the body is much less than that of the emotions. Of the intellectual faculties, the imagination is that which has the strongest affinity with the emotions and passions, for its operations, like theirs, are attended by excitement. It seems, indeed, to hold a middle place between the intellect on the one hand, and the passions on the other; adding vigour and originality to thought, whilst it lends attraction to the objects of desire, and gives intensity to every effort by which they can be compassed. Hence the twofold power of imagination.

444. Imagination is the only intellectual faculty which exercises a direct influence on the bodily organs; those organs being, as already stated, the organs of sense. It acts by producing in them, or in the parts of the brain with which they communicate, the same state which is usually brought about by external objects actually present to them. All the organs of sense—the eye, the ear, the nose, the palate, the skin—may become the theatre of these false impressions; but the eye is the most liable to be affected by them. These false impressions on the organ of vision are called *ocular spectra*, or *spectral illusions*.

445. *Spectral illusions* occur in many different states of system, and vary in their intensity. Sometimes they occur to imaginative persons in perfect health, sometimes to persons suffering from indigestion or debilitated by long illnesses, or after mental excitement, or in consequence of suppressed discharges. They have every degree of intensity, from a flash of light, a circle of colours, or an indistinct outline, to a perfect picture not readily distinguishable from that produced by a real object. In some instances, they can be called up at will; in some, they are quite involuntary; and in others, they are partly involuntary and partly subject to the will. Müller states that in his case they are involuntary; the poet Goethe could call them up by an effort of the will, but had no power over them when once produced.*

446. Several interesting cases of ocula spectra, so closely resembling real objects as not to be distinguished but by the most careful exercise of comparison and judgment, are related by Sir David Brewster, in his work on Natural Magic, and by Sir Walter Scott, in his "Demonology and Witchcraft." That of Nicolai, the Berlin bookseller, is not the least remarkable, and was distinctly traced to the suppression of an habitual discharge of blood by hæmorrhoids, the immediate exciting cause being a violent fit of passion.

447. During sleep, false impressions on the senses are of frequent occurrence, and constitute dreams, which have the air of reality, from not being corrected, as in the waking state, by the judgment. Recent impressions on the senses also give rise to long trains of thought, and stimulate the fancy of the sleeper to the invention of connected histories of occurrences which, though they seem to occupy hours, days, or years, have been shown to be compressed into the compass of a few seconds.

448. Dreams are sometimes accompanied by actions of the voluntary muscles, and persons talk or walk in their sleep. The actions, in these cases, are in conformity with the train of thought passing through the mind, and the senses are active only within the circle of those thoughts. This is somnambulism.

449. In mania, false sensations are of frequent occurrence, are believed as realities, and are interpreted according to the delusion which exists, thus becoming compound delusions. The madman believes in the reality of these sensations, because he has lost the faculty of comparison, and in as far as such sensations constitute madness, belief in their reality is the test of its existence. The essence of all aberrations

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* See Müller, part vi., p. 1397. I may here state, that, when a feeble and sickly child, I possessed the power of creating ocular spectra at will in a very remarkable degree. I could design on the dark ground, and on a small scale, any picture, however complicated, filling in object after object with all the outlines and colours true to nature. During this period, my imagination was uncommonly active in sleep, occasioning dreams of the most fearful kind. As my health improved, I lost this power of creating images at will, and since my seventh year have never regained it, though I have suffered occasionally from false impressions on the sense of hearing.—Ed.

of intellect is a belief in the reality of the workings of the fancy; belief, therefore, becomes the chief test of intellectual mania.

450. The influence of the passions and emotions on the body is much more extensive than that of the imagination; for the imagination, in the strict sense of the term, and acting without the passions, affects only the organs of sense, while the passions acting with, or excited by the imagination, influence not the senses only, but almost every part and every function of the body. Thus fear, acting through the imagination, creates false sensations; as in the curious case of a thief to whom, in common with other suspected persons, a stick of a certain length was given, with the assurance that the stick of the thief would grow by supernatural power. The culprit, imagining that his stick had actually increased in length, broke a piece off, and was thus detected. A similar anecdote is told of a farmer, who detected depredations on his corn-bin, by calling his men together, and making them mix up a quantity of feathers in a sieve, assuring them, at the same time, that the feathers would infallibly stick to the hair of the thief. After a short time, one of the men raised his hand repeatedly to his head, and thus betrayed himself.

451. The power which the emotions exercise over the secretions is equally well known. The Indian method of detecting a thief, by causing all the suspected persons to chew a portion of rice, and to spit it out upon a leaf, is a familiar illustration of this. The anxiety of the culprit arrests the flow of saliva, and the unmoistened rice convicts him. In the greater number of instances, however, the effect of the emotions is to increase the secretions; thus, fear causes diarrhœa and profuse perspiration; anxiety increases the flow of urine; both grief and joy that of tears.

452. The effect of the emotions on the muscular system is strongly marked. The exciting passions cause laughing, crying, and sobbing, with spasmodic contraction of the features, and they give strength to the muscles; the depressing passions, on the contrary, as terror, paralyse the muscles of the face and of the entire body, including the sphincters. The influence which the emotions, whether exciting or depressing, have upon the entire circulating system, from the centre to the extreme capillaries, has already been alluded to; their long-continued effect accounts for the diminished nutrition attendant upon anxiety and over-exertion of the mind, and is marked in the pallid aspect of the hard student or man of business.

453. The cure of ague, paralysis, &c., by a strong impression on the imagination, evinces still more strongly the power of the mind over the body. The same power is evidenced, in a less degree, by the striking improvement which often takes place in functional disorders under treatment inoperative in itself, but rendered effectual by the confident expectation of relief in the mind of the patient.

454. The reaction of the body on the mind is a subject of much

interest, but of too great extent to receive more than a passing notice in this place. Melancholia, hypochondriasis, and hysteria, are instances of the effect which the important organs of the body, especially the chylopoietic viscera and the uterine system of the female, have upon the mind. The same local irritation which, confined to the spinal marrow, impairs or altogether perverts the action of the voluntary muscles, seems, when it extends to the brain, to rob the higher faculties of the mind of their usual control over the imagination, and to give rise to states of intellect closely bordering on insanity; witness the extraordinary deceptions practised by the hysteric female, and often persevered in at the expense of pain and privation, under which nothing short of a strong delusion could support her.

455. To complete this outline of physiology and general pathology, it would be necessary to say something of the generative system, especially in the female. Some of the disorders of that system, as far as they react on the general health, have already been glanced at; the narrow limits of this work prevent more minute details. Some important portions of physiology which have been but cursorily mentioned in the present sketch will be more carefully and minutely examined in the following chapters.

CHAPTER III.

EXAMINATION OF THE MORE IMPORTANT SYMPTOMS AND SIGNS OF DISEASE.

The subjects contained in this chapter are arranged nearly in the order in which they were treated in the former chapter. They are the following: 1, Examination of the blood; 2, of the urine; 3, of the abdomen; 4, of the chest; 5, of the pulse; 6, of the respiration.

1. THE BLOOD.

456. It is usual to examine the blood after its abstraction by bleeding, with a view to a more accurate knowledge of the state of system in which the remedy was prescribed.

457. The appearances supposed to indicate the existence of inflammation, to justify the past abstraction of blood, and to warrant a fresh recourse to the lancet, are a buffed surface or coat, and a cupped appearance. When the blood presents both these characters, it is said to be *buffed* and *cupped*. It is of great importance to understand the nature and causes of this peculiar arrangement of the different parts of the blood, as this knowledge will go a great way in deciding the question—whether it is or is not to be regarded as a sign of inflammation?

458. Healthy blood drawn from a vein, and suffered to remain at rest, undergoes two principal changes, the one consisting in the subsidence of a portion of its red particles, the other in a coagulation of the mass of the fluid. The subsidence of the red particles begins to take place as soon as the blood is drawn; the coagulation rapidly follows, and in about ten minutes converts the blood into a loose jelly. The blood thus transformed from a homogeneous fluid into a nearly homogeneous solid undergoes a further change, which is often not complete till after the lapse of twenty-four hours or more. This change consists in the progressive contraction of the fibrin in the lower part of the clot, which presses out the serum and entangles the red particles. This mass of fibrin and red particles floating in the expressed serum constitutes the clot.

459. The layer of liquor sanguinis on the surface of the clot occasions the buffy coat, the hollow or cupped appearance of which arises from the strong contraction of the fibrin of this liquor sanguinis freed from red particles by previous subsidence. The lower portion of the clot,

which consists of fibrin and red particles, is larger and looser. The buffy coat, therefore, depends upon the more or less complete separation of the liquor sanguinis from the other portions of the blood, and the cupped appearance upon the force with which the fibrin contracts.

460. According to this view, the formation of the buffy coat may be brought about by more causes than one. If the red particles retain their natural specific gravity, while that of the liquor sanguinis is diminished, or if the red particles have a greater specific gravity than usual, whilst the liquor sanguinis has its normal density, or, again, if the red particles have an unusual tendency to coalesce and adhere (as has been shown to be the case in inflammation), they will sink rapidly, and the separation between the upper and lower parts of the clot will be complete. The opposite conditions of the two portions of the blood will, of course, produce opposite results. If, whilst the contractility of the fibrin remains the same in two cases, the quantity is increased in one and diminished in the other, the clot will be large in the one case and small in the other; on the other hand, if the quantity of fibrin remaining the same in two cases, the contractility is great in the one and small in the other, we shall have the cupped appearance in the former, whilst the surface of the clot will remain comparatively flat in the latter. The thickness of the buffed surface will depend upon the quantity of the liquor sanguinis which has separated from the rest of the clot; and this quantity will vary with the time which elapses before the fibrin begins to contract. The slower the coagulation, therefore, the thicker the buffy coat. A great diminution in the quantity of the red globules will, of course, favour the complete separation of the liquor sanguinis. Hence this may be also a cause of the buffy coat.

461. In the process of coagulation, then, there are two stages or steps—the subsidence of the red particles and consequent separation of the liquor sanguinis, and the contraction of the fibrin. The quantity of the liquor sanguinis, and the consequent thickness of the buffy coat, will vary directly as the rapidity of the coagulation and the density of the globules; the surface of the clot will be flat or hollow as the contraction of the fibrin is more or less firm, and the size of the clot will vary directly as the quantity of the fibrin, and inversely as its contractility. When the contractility is slight, the serum is imperfectly pressed out of the liquor sanguinis, and the serum and red globules from the remainder of the clot; when, on the other hand, the fibrin contracts strongly, it diminishes the size of both portions of the clot. It is because the upper part of the clot consists entirely of liquor sanguinis, whilst the lower contains all the elements of the blood (liquor sanguinis and red globules), that the upper portion is always smaller than the lower; hence the clot is not unlike a cupping-glass in shape.

462. The separation of the liquor sanguinis and the degree of contraction of the fibrin, which so greatly modify the appearance of the

clot, are themselves influenced by a variety of causes. Thus the separation is more complete, and the buffy coat, *cæteris paribus*, more strongly marked when the blood is drawn in a full stream into a deep vessel; the reverse takes place when the stream is slow and the vessel shallow. The temperature of the blood itself, and of the place in which it is kept, also exerts an influence, warmth being favourable to its complete separation. The same is true of exposure to the air. The size of the stream and the depth of the vessel probably affect the separation by retaining the warmth for a longer or shorter period.

463. The contraction of the fibrin is also strongly influenced by the shape of the vessel in which the blood is drawn. Thus, in one experiment performed by Dr. Babington, the clot formed in a pear-shaped vessel weighed scarcely half that formed from the same blood in a common pint basin; that is to say, the fibrin contracted more firmly, and pressed out a larger quantity of serum and red globules in the former case than in the latter.

464. Seeing that such slight causes can influence the formation of the clot, it is scarcely to be expected that much reliance should be placed on the cupped and buffed appearance of the blood as a sign of inflammation, unless great precautions are used to ensure an accurate resemblance of one observation to another in every respect.

465. The value of this sign, however, must be decided by an appeal to facts, and for these we are indebted to M. Andral.* The following table presents the results which he obtained from a large number of observations. The results are here stated in per centage proportions:—

	Per Cent.
Acute rheumatism and pneumonia: well-marked buffy-coat in	93
Acute amygdalitis (cynanche tonsillaris)	75
Pulmonary tubercle	69
Chlorosis	64
Lead colic	30
Bronchitis (including capillary bronchitis)	28
Pleuritic effusion	26
Chronic rheumatism	22
Hypertrophy of the heart and intermittent fever	15
Cerebral congestion	13
——— hæmorrhage	9
Typhoid fever (uncomplicated with pneumonia)	0
Albuminuria	
Rubeola and scarlatina (uncomplicated with nephritis)	

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* Gazette Médicale; and Med. Chir. Rev., Oct. 1841.

466. It will be observed, that the first four diseases on this list are those which have been already shown (§ 172) to be accompanied with a positive increase of fibrin, whilst chlorosis is characterised by an excess of fibrin as compared with the quantity of the red globules. Hence, then, the existence of the buffy coat may be assumed to depend either on an absolute or relative increase of fibrin. Andral also states, that when the blood contains fibrin in excess, coagulation goes on more slowly than when it is deficient. "The increase of the relative proportion of the fibrin to the globules may occur in two conditions: 1. The quantity of the globules being normal, that of the fibrin may rise from 3 or 4 (the standard in health) to 10; under such circumstances the formation of the buffy coat is uniform and constant, its thickness and consistence being proportionate to the excess in the relative quantity of the fibrin. This is the case in all the genuine phlegmasiæ, in which there is a real and absolute increase of fibrin. 2. The quantity of the fibrin may be normal, but that of the globules may be considerably reduced. Now, in this case, although there is no absolute excess of the fibrin, a genuine and well-marked buffy coat, with retracted and puckered edges, may be formed on the blood, although there be no inflammatory disease present. Hence we observe the phenomenon in the blood of chlorotic girls."

467. The mere presence of the buffy coat, therefore, is by no means an indication of the existence of inflammatory action; all that it indicates is, that there is an alteration in the relative quantities of the fibrin and the red globules, or an excess, either absolute or relative, of the fibrin. The fact that the buffy coat may occur in diseases not characterised by acute inflammation, as in the second and third divisions of the table, should put us on our guard against placing too much reliance on the phenomenon as a sign of pre-existing inflammation sufficiently severe to justify the further abstraction of blood.*

2. THE URINE.

Properties of Healthy Urine.

468. *Physical Properties.*—Healthy urine, recently voided, has the temperature of the body. It is perfectly transparent, and of a light amber colour. Its odour is peculiar, but not unpleasant; its taste salt and bitter. On cooling, its peculiar odour disappears.

The specific gravity of the urine ranges from 1005 to 1033.

469. *Chemical Properties.*—Healthy urine has a slight acid reaction. It remains unchanged when heated to the boiling point, nor does it

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* The chemical and microscopic examination of the blood has not yet attained such a degree of practical importance as to demand a place in these pages. A very clear and succinct account of the best modes of ascertaining the quantities of the several constituents of the blood, with a description of its microscopic characters, will be found in Mr. J. E. Bowman's "Practical Hand-Book of Medical Chemistry."

yield any precipitates with the mineral acids. Oxalic acid produces a slight cloud of oxalate of lime. The free alkalies also throw down a precipitate—the phosphate of lime. The salts of baryta, silver and lead, cause precipitates; and tannin occasions a slight cloudiness.

470. *Effects of Decomposition.*—After standing for some time, slight clouds consisting of mucus form in the urine, and gradually fall to the bottom of the vessel This change is soon followed by decomposition, which shows itself by an unpleasant odour and an alkaline reaction; carbonate of ammonia is formed, and may be detected by effervescence with acids; and the ammoniaco-magnesian phosphate and phosphate of lime are thrown down. A portion of these salts entangled by mucus form a scum in which we may detect, under the microscope, crystals of ammoniaco-magnesian phosphate mixed with the constituents of mucus and with amorphus phosphate of lime. Decomposition continuing to advance, the odour becomes still more disagreeable, and a blue or gray mould forms on the surface; while prismatic crystals of common salt, muriate of ammonia, and phosphate of soda and ammonia, collect at the bottom or cling to the sides of the vessel.

471. *Constituents of Healthy Urine.*—The following are the leading constituents of healthy human urine: water; urea; uric acid; lactic, carbonic, hydrochloric, sulphuric, and phosphoric acids in combination with the bases, soda, potash, ammonia, magnesia, and lime; with vesical mucus, and extractive matters. Hippuric acid is also considered by Liebig to form a constant constituent of human urine.

472. On account of the variable quantity of water existing in different specimens of healthy urine, and the equally wide variations in the solid constituents due to age, sex, time of day, character of food, amount of exercise, &c., it is not possible to give even an approximate analysis of this fluid. The following table, however, is a rude approximation in round numbers to the mean of a considerable number of recorded analyses:—

Water	950
Urea	25
Uric Acid . . .	1
Fixed Salts . . .	14
Organic Matter . .	10
	1,000

The salts consist chiefly of hydrochloric, sulphuric, and phosphoric acids in combination with potash, soda, lime, and magnesia; the organic matters, of mucus, lactic acid, free or in combination, and extractive matters.

473. The constituents of the urine, when obtained from the solid residue, so as to remove the more variable element of the water, are

still subject to wide variations even in health, as will be seen from the following table, which is also founded on several analyses.

In 1,000 parts of the solid residue, the greatest, least, and average quantities of the several ingredients were as follows:—

	Max.	Min.	Mean.
Urea	500	300	420
Uric Acid	16	14	15
Extractive Matter, Chloride of Sodium and Salts of Ammonia .	509	258	381
Alkaline Sulphates . . .	120	81	103
Alkaline Phosphates. . .	68	45	59
Phosphate of Lime and Magnesia.	19	14	16

474. *Quantity Voided in Twenty-four Hours.*—This varies in different persons, and in the same person at different times and under different circumstances. The following are some of the estimates of authors:—Haller, 49 oz.; Keill, 38 oz; Prout, 32 oz. (30 oz. in the summer and 40 oz. in the winter); Christison, 35 oz.; Rayer, from 21 to 57 oz.; Simon, 45 oz.; Dr. Dalton's experiments on his own person give 48½ oz. (month of November), 51½ oz. (month of June). The average of these experiments and estimates is about 41 oz., or little more than two imperial pints. The urine amounts to more than half the entire solid and liquid ingesta.

475. The quantity of the urine in a healthy subject varies inversely as the quantity of the pulmonary and cutaneous exhalation. Hence it is greater in winter than in summer, in a cold than in a warm atmosphere. It is greater during the day than during the same number of hours at night, and it is greater in the morning than in the evening. It is also increased by excitement and anxiety of mind.

476. In disease also, the quantity of the urine is increased whenever the pulmonary and cutaneous transpiration is suppressed, excepting only in those cases where all the secretions are simultaneously diminished by high febrile action. In the cold stage of intermittent fever, under the influence of strong nervous excitement, and in hysterical and hypochondriacal paroxysms, an increased flow of urine takes place. In such cases the character of the urine is not changed, the quantity of water only being increased. This increase, without any change in the composition of the urine, may amount to 30 or 40 pints daily. The quantity of the urine may also be increased with a deficiency or with an excess of urea, or it may contain sugar, as in diabetes mellitus, or chyle.

477. On the other hand, the quantity is diminished by increase of the cutaneons and pulmonary transpiration, by profuse diarrhœa, in cholera, by hæmorrhage, in dropsy, in many forms of acute inflammation, and in the inflammatory stage of fever. It is suppressed, or greatly diminished, in inflammation of the kidney, and under the operation of the more active irritant poisons.

478. The quantity of the more important solid constituents of the urine, especially urea and uric acid, is also subject to considerable differences in healthy persons. It is at its maximum in men in the prime of life, less abundant in females, and at its minimum in old age and childhood. It is increased by exercise and diminished by rest. It also varies with the quantity of the food. The urea and uric acid increase under an animal diet, and are diminished when vegetable food only is taken.

479. *Density of the Urine.*—1,010 (Thomson); 1,015 winter, and 1,025 summer (Prout); 1,015 for adults, and 1,010, including children (Willis); 1,012—1,017 (Venables); 1,016 (Macgregor); 1,005—1,030 (Müller); 1,029 (Christison); 1,005 to 1,030, average 1,012·5 (Simon); 1,005 to 1,033 for adult and middle age (Dr. J. C. Gregory). According to the accurate observations of the last-named observer, the greatest range in the same individual is 21 degrees, the ordinary range from 1,016 to 1,031 and the average of 363 experiments on 50 individuals, 1,022·5. The average for 5 individuals whose urine was examined between 20 and 50 times each was 1,025·2.

480. The density of the urine is greater in males than females; it increases from childhood to manhood, and falls again in old age; it is increased by hot weather, by much exercise, by free perspiration, by a very dry diet, by animal diet, by substances containing much azote, by the meal of dinner, and during sleep. It is diminished by cold, by sedentary habits, by a watery diet, by vegetable food, by acids, and alcoholic fluids. It is at its average in the morning on waking; it falls considerably after breakfast; it rises again gradually after midday; it sinks again immediately after dinner, but in a few hours rises higher than at any other time; and in the course of the night gradually returns again towards its average.

481. The urine secreted after the digestion of food differs widely from that which is secreted after fluids have been taken. The former, the "urina chyli," contains, according to Nysten, thirteen times as much urea, sixteen times as much uric acid, and four times as large a quantity of salts as the latter, the "urina potus." It has also an alkaline reaction. The first urine passed after a meal with which much water is taken, would probably be found to be nearly allied to the "urina potus," but to contain somewhat more animal matter.

482. The density of the urine in disease may vary from 1,001 to 1,055; and as the density in health does not appear to fall below 1,005, nor rise above 1,033, it follows that any number less than 1,005 and above 1,033 should be regarded as a sign of disease, and any number approaching either limit ought to attract attention. A less density than 1,005 points to an increase in the quantity of the urine, with a diminution of some of its solid constituents. A greater density than 1,033 strongly indicates diabetes, though 1,030—1,035 has been observed in cases of increased secretion with excess of urea.

483. The *solids* discharged have been known to amount in the day to 36 ounces avoirdupois, and to fall as low as 11 grains. The average quantity falls short of an ounce and a half.

484. The *colour* of the urine in health is inversely as its quantity; when the urine is scanty, it is high coloured; when it is abundant, limpid. The urine first passed in the morning is usually of a higher colour than that passed later in the day. The urine is pale in all diseases accompanied with an increase of quantity; whilst the natural colour is deepened by a decrease in the quantity. It may be white or bluish-white and turbid from the admixture of chyle, milk, mucus, or pus, or of the earthy phosphates in excess; deep yellow or greenish-yellow, from bile or the cystic oxide; dark red or purplish, from the admixture of the purpurates, as in inflammatory diseases; yellow-red, as in hectic and the sweating stage of intermittent fevers; brownish or cherry-red, from the admixture of the red particles of the blood; black, from the admixture of melanic acid; blue, from the cyanuric acid, &c. Several substances taken with the food, such as rhubarb, madder, beet-root, corn-poppy, and logwood, are also said to give a similar colour to the urine with that produced by blood.

485. The natural *odour* of the urine is wanting where it is in large quantity and of a pale colour, and increases as the urine diminishes and deepens in colour: it is altered by various articles of food, such as asparagus; it is aromatic in many nervous affections; ammoniacal in injuries of the spinal cord; putrid from the admixture of pus, mucus, ichor, &c., in diseases of the urinary organs, and in the last stages of putrid fevers; sweetish in diabetes mellitus; and has the odour of sweet briar or of violets, when it contains cystine, and probably under other circumstances.

The *taste* of the urine is perceptibly sweet in well-marked cases of diabetes mellitus.

The Urine in Disease.

486. The abnormal conditions of the urine may be divided into two classes:—

(1.) The normal constituents of the urine (§ 472) may be in excess, in defect, or altogether absent.

(2.) The urine may contain substances foreign to its normal composition.

487. This second class admits of further subdivision as follows:—

(1.) Salts of ammonia and lime, of which one or other of the constituents, or both exist in healthy urine, namely, carbonate of ammonia, carbonate of lime, and oxalate of lime.

(2.) Substances which result from the imperfect assimilation of the food; namely, cystine, chyle, fat, milk, sugar, and bile, to which may be added the kiestein, found in the urine of pregnant women.

(3.) The blood or its constituents, the red particles, fibrin, and albumen.

(4.) Secretions of the lining membrane of the urinary organs; namely, mucus, and epithelial scales (these exist in small quantity in healthy urine, and belong to the 1st division), and pus; to which must be added casts of the urinary tubes.

(5.) Admixture of animal secretions derived from neighbouring organs, as semen and the gonorrhœal and leucorrhœal discharges.

(6.) Poisons and substances used as medicines, of which the list is almost co-extensive with the substances themselves, comprising the principal metallic bases, the non-metallic bodies, the organic and inorganic acids, and their salts.

Examination of the Urine.

488. For the detection of the several substances mentioned in the foregoing enumeration, the medical man must resort to chemical tests, aided by the microscope. Our tests have sometimes to be applied to the urine as it is passed; in other instances the urine having been allowed to remain at rest for some time, we examine in turn the clear supernatant portion and the deposits. The microscope is generally employed to identify the deposited matters, or those thrown down by chemical reagents.

489. *Tests.*—The tests in most common use are turmeric and litmus paper, heat, and nitric acid. Hydrochloric and acetic acids, liquor ammoniæ, and liquor potassæ are also frequently employed; and, for certain purposes, a solution of oxalate of ammonia, a solution of sulphate of copper, a solution of oxalic acid, and alcohol are required. A spirit-lamp, and fragment of platinum foil, and an urinometer, or 1,000 grain-bottle, complete the list of materials required for the chemical examination of the urine for common purposes.

490. The apparatus required for microscopic examinations, in addition to the microscope itself, consists of a few conical glasses (wine-glasses with narrow stems will answer the purpose), for collecting deposits, and a *pipette*. The deposits which we desire to examine under the microscope are allowed to collect in the stem of the glass, are then drawn off by the pipette, and placed in a glass cell, or on a fragment of glass under the field of the microscope.

491. The urine submitted to examination in cases of disease, should be either an average specimen of the entire day, or that voided on first rising in the morning.

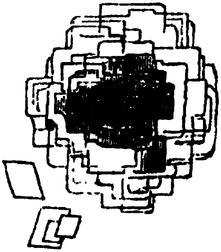
492. In order to present a complete view of this subject, it will be expedient first to detail the principal indications of the tests, and, secondly, to describe the chemical and microscopical properties of the several constituents of the urine in health or disease.

Turmeric paper is changed from yellow to brown, when the urine is alkaline; blue *litmus paper* to red when the urine is acid. *Heat* throws down albumen and the phosphates when they are in excess, but dissolves the urates of soda and ammonia. *Nitric acid.*—This acid throws down a dead-white precipitate of albumen; it precipitates uric acid after the lapse of some hours, and dissolves it with effervescence; it also dissolves the oxalate of lime and the alkaline and earthy phosphates; it precipitates the colouring matter of bile of a green colour, but if added in excess, it changes it quickly to a dingy red, and afterwards to a brown; it also detects urea in excess, when added to an equal quantity of urine, by the formation of crystals of nitrate of urea. Moreover, it produces a cloudiness in urine containing certain essential oils. *Hydrochloric acid* precipitates uric and hippuric acid and the colouring matter of the bile. It throws down the latter of a green colour, whatever quantity may be added. It also dissolves the oxalate of lime, cystine, and the phosphates. *Acetic acid* produces a cloudiness in urine containing mucus; it dissolves the alkaline phosphates and the phosphate of lime sparingly. *Sulphuric acid*, added to warm urine, containing sugar or albumen, causes a deposit of carbon. *Caustic ammonia* throws down the earthy phosphates as a white precipitate, and dissolves cystine; its vapour imparts a rich purple hue to the crystals of uric acid. The *oxalate of ammonia* is used to detect the presence of the phosphate of lime. *Caustic potash* dissolves uric acid and the urates of soda and ammonia. With the aid of heat it disengages ammonia from the urate of ammonia; it also changes saccharine urine to a dark brown colour, and thickens purulent deposits. *A solution of sulphate of copper*, previously rendered strongly alkaline by caustic potash, when heated with saccharine urine, detects the presence of sugar by causing a deposit of the red oxide of copper. *Alcohol*, by the aid of heat, dissolves cholesterine, and hippuric acid. *Oxalic acid in solution* throws down a characteristic oxalate of urea.

The following are the chemical and microscopical characters of the principal constituents of the urine in health and disease.

493. *Urea.*—This principle in excess gives a high specific gravity to the urine (1·030 or more). If abundant, it may be detected by adding to a small quantity of urine in a watch-glass an equal bulk of strong nitric acid. If this is kept in a cool place, crystals of nitrate of urea are formed. If, however, the quantity of urea is small, we must evaporate before applying the nitric acid.

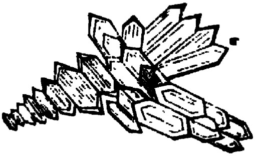
Fig. 10.



The best process for detecting urea and obtaining well-formed crystals of nitrate of urea is the following:—Evaporate a portion of urine in a water-bath to the consistence of a syrup; add strong alcohol, filter the alcoholic solution, and evaporate it in the water-bath nearly to dryness; add a few drops of water and of strong nitric acid. Crystals of nitrate of urea are speedily formed, which assume, under the microscope, the form depicted in fig. 10. For practical purposes the presence of urea may be readily detected by evaporating a few drops of urine on a fragment of glass, and adding an equal quantity of nitric acid.

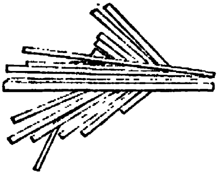
If we substitute oxalic for nitric acid, we obtain crystals of the microscopic form annexed:—

Fig. 11.



The alcoholic extract of urea leaves, on spontaneous evaporation acicular crystals of the following form:—

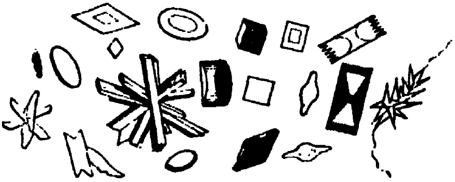
Fig. 12.



494. *Uric Acid.*—Uric or lithic acid sometimes exists in the urine in such quantity as to separate from it, on cooling, in the form of a crystalline deposit. It is very rarely voided as gravel; but it is a frequent constituent of urinary calculi. Uric acid, as existing in urinary deposits, has every tint from light yellow to deep orange-red, varying with the colouring matter with which it is blended. Hence the familiar names of "yellow and red sand." Urine which yields uric acid deposits has generally a higher colour than natural, an acid reaction, and a specific gravity of 1·020 or more. Uric acid may be separated from urine which yields no deposit on cooling, by adding hydrochloric acid in the proportion of two or three drachms to six or eight ounces of urine. The mixture, on being allowed to stand in a covered vessel for twenty-four to forty-eight hours, yields a red or reddish-brown sediment of uric acid.

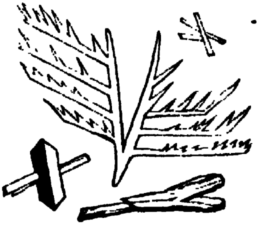
Uric acid has the following chemical characters. It is insoluble in water; it is not redissolved when the urine is heated; it is soluble in caustic potash, and precipitated granular and colourless from this menstruum by the addition of an acid; it is dissolved by nitric acid with effervescence, and on evaporation to dryness yields a red or pink residue, which is changed to a rich purple when exposed to the vapour of ammonia. Heated on platinum foil the uric acid burns, giving out an odour of bitter almonds, and leaving a scanty white ash. Uric acid assumes, under the microscope, one or other of the annexed forms. (One of the figures represents the uric acid crystallized on a hair.)

Fig. 13.



495. *Hippuric Acid.*—This, which is an abundant constituent of the urine of herbivorous animals, also exists in human urine. It may be obtained by evaporating a few ounces of urine to the consistence of a syrup, and adding hydrochloric acid in excess. A mixture of uric and hippuric acids is thrown down. This deposit, having been washed in cold water, is to be boiled with alcohol. The hippuric acid will be dissolved, and, on evaporating the spirituous solution, is deposited in the form represented in the annexed engraving.

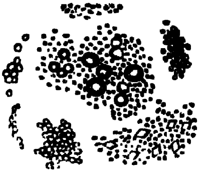
Fig. 14.



496. *Urate of Ammonia.*—This salt is sometimes found diffused through the urine, so as to give it the ropy appearance commonly due to muco-pus; in other instances it exists as a whitish deposit; in others again as a reddish-brown deposit, familiarly known as the *lateritious* or *brick-dust* sediment.

Urine rendered turbid by urate of ammonia becomes clear when heated, or on the addition of liquor potassæ. When acidulated it deposits crystals of uric acid. The sediment when heated with liquor potassæ gives out ammonia. Under the microscope, urate of ammonia has the annexed appearance.

Fig. 15.

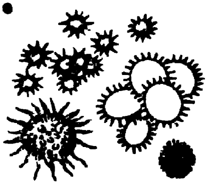


497. *Urate of Soda.*—Is of comparatively rare occurrence, but is sometimes met with in gout, and in fever patients treated with carbonate of soda, as observed by Dr. Golding Bird.

Urate of soda is soluble in the urine when heated, and on the addition of an alkali, and deposits uric acid on the addition of an acid. It imparts a yellow colour to the outer flame of the blow-pipe.

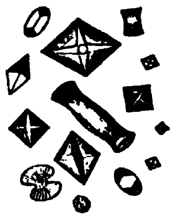
Under the microscope it presents the annexed characteristic forms.

Fig. 16.



498. *Oxalate of Lime.*—This, which is a common constituent of urinary calculi, and the material of the so-called mulberry calculus, frequently exists in the urine, rarely as a deposit, but more frequently diffused through it in the form of minute octahedral crystals which are visible under the microscope. It may be known by its insolubility in water, liquor potassæ, and acetic acid. It is soluble in nitric acid, and is converted at a red heat into *carbonate of lime*, which is identified by dissolving with effervescence in acids.

Fig. 17.



Oxalate of lime, when it exists in the urine, may be obtained for the purpose of chemical or microscopic examination in the following manner. One or two ounces of urine are allowed to stand for a few hours in a wine-glass with a small stem. A small portion of the lower stratum is then withdrawn by the pipette, placed in a watch-glass, and gently heated. Crystals of the oxalate of lime will be deposited, which may be collected at the bottom of the glass by gently rotating the fluid. After allowing it to remain at rest for a few minutes, the fluid portion may be withdrawn by the pipette, its place being supplied by distilled water. The white glistening powder may be again collected in the centre of the glass by gently rotating it, and may be transferred by the aid of the pipette to the field of the microscope.

The oxalate of lime so obtained presents under the miscroscope one or other of the forms depicted in Fig. 17.

499. *The Phosphates.*—Phosphoric acid exists in urine in combination with alkaline and earthy bases. We may be required to examine:—

(1.) The ammonio-phosphate of magnesia, or the triple phosphate.

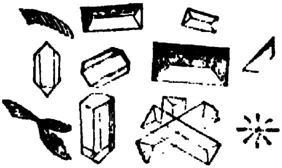
(2.) The ammonio-phosphate of magnesia, with excess of ammonia, known as the basic or bibasic phosphate.

(3.) Phosphate of lime.

500. These deposits have the following properties in common. They generally occur in neutral or slightly alkaline urine; are white unless tinged with blood; are not dissolved by heating the urine which contains them, but are, on the contrary, thrown down by heat; they are soluble in weak acids, but insoluble in water, in ammonia, and in liquor potassæ. The phosphate of lime is less soluble in acids. Heated separately they fuse with great difficulty; but when combined in nearly equal proportions, the phosphate of lime and the triple phosphate fuse readily, constituting the fusible calculus.

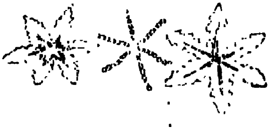
(1.) *The ammonio-magnesian phosphate, or triple phosphate.*—On adding a few drops of ammonia to healthy urine, the urine becomes turbid, and deposits the triple salt in combination with phosphate of lime. The same result may happen from the development of ammonia or its carbonate when the urine is allowed to stand some hours. The triple phosphate may present itself in any of the following forms:—*a.* As a white crystalline gravel. *b.* As a thin iridescent film on the surface of the urine. *c.* As a dense white deposit closely resembling mucus. *d.* In masses or ropes resembling puriform mucus. Under the microscope the triple phosphate presents itself in some of the annexed forms. (Fig. 18.)

Fig. 18.



(2.) *The basic or bibasic phosphate* (the triple phosphate, with excess of ammonia) has the microscopic characters shown in the annexed engraving. (Fig. 19.)

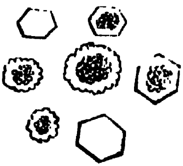
Fig. 19.



(3.) *The phosphate of lime* occurs as an amorphous deposit, or in little rounded particles, usually found adhering to the crystals of the triple phosphate.

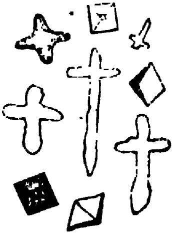
501. *Cystine.*—This curious substance, which is characterised by the great excess of sulphur that enters into its composition, is not a constituent of healthy urine, and rarely exists as a product of disease. It constitutes a rare form of urinary calculus, and very seldom exists as a deposit. The urine which contains cystine is usually of a pale yellow colour, of low specific gravity, and of an odour resembling sweet-briar. The deposit of cystine is white, or of a pale fawn colour, distinguished from white urate of ammonia, by not disappearing on the application of heat to the urine which contains it, and from the earthy phosphates by its insolubility in dilute hydrochloric or strong acetic acid. Cystine is at once distinguished from all other deposits by its ready solubility in ammonia. The ammoniacal solution, on being allowed to evaporate, yields well-formed hexagonal plates or prisms, which present the microscopic characters depicted in Fig. 20.

Fig. 20.



The simple hexagonal form of cystine resembles that of common salt, which sometimes forms a crystalline deposit on the evaporation of the urine. The crystals of common salt, on hasty evaporation, wear an irregular cruciform appearance, as depicted in Fig 21.

Fig. 21.



502. *Chyle.*—The term chylous urine has been applied by Dr. Prout to urine which on cooling gelatinises spontaneously, assuming the appearance and consistence of *blanc-mange.* It contains a large quantity of

albumen and fat. Its spontaneous coagulation sufficiently distinguishes it.

503. *Fat.*—Urine may contain fat either as a separate element, or as a constituent of chyle or milk. It is also of frequent occurrence in the shape of oil-globules attached to epithelial cells, or casts of tubes. The oil-globules are easily recognised under the microscope. (See § 344, Fig. 6, and Fig. 30.) The quantity of fat existing in the urine may be ascertained by evaporating a measured portion of the fluid, dissolving repeatedly with ether, evaporating the ether by a gentle heat, and weighing the residue.

504. *Milk.*—Urine containing milk is turbid, of a yellowish-white colour, and contains fat vesicles, which may be seen under the microscope. Milky urine does not coagulate by heat, unless the quantity of lactic acid be considerable, or unless it also contain albumen. On adding to a small quantity of the urine moderately warmed a few drops of acetic, dilute sulphuric, or hydrochloric acid, flocculi of coagulated casein are formed. The quantity of casein may be determined by collecting these flocculi, washing and drying them, and then dissolving out the oil-globules by ether.

505. *Sugar.*—The presence of sugar may be sometimes detected by the taste, especially if we first evaporate the urine to the consistence of a syrup; but this test is inconvenient in practice, and not to be depended upon.

The specific gravity of the urine is the test commonly employed at the bedside. This affords certain evidence of the existence of sugar only when it exceeds 1·035, which is probably about the highest specific gravity of urine containing urea in excess. The specific gravity of diabetic urine ranges from 1·020 to 1·050. Hence, when the symptoms lead to a suspicion of the presence of sugar, a specific gravity above 1·020, though a little below the average in health, would lead us to apply some of the following tests:—

(1.) *Trommer's test.*—Add enough solution of sulphate of copper to give the urine a faint blue tint; then add liquor potassæ in excess. A precipitate of hydrated oxide of copper is formed, which dissolves in the excess of alkali. On heating the liquid to ebullition, the red suboxide of copper is thrown down if sugar be present. The test is most conveniently applied in a large test tube.

(2.) *Fehling's test solution.*—This may be conveniently substituted for the sulphate of copper and caustic potass used in Trommer's test. The solution is prepared by dissolving 69 grains of sulphate of copper in five times its weight of distilled water, and adding a concentrated solution of 268 grains of tartrate of potash, and then a solution of 80 grains of caustic soda in one ounce of distilled water.

The following tests have been recommended, but are less free from objection than the foregoing:—

(3.) *Moore's test,* with *liquor potassæ.*—Pour a small quantity of the urine supposed to contain sugar into a test tube, add to it about half its bulk of liquor potassæ, and boil for one or two minutes by the heat of a spirit lamp. The urine will assume an orange-brown tint of a depth proportioned to the quantity of sugar.

(4.) *Runge's test*, with *dilute sulphuric acid.*—Evaporate a small quantity of the suspected urine on a surface of white porcelain, add to the warm liquid a few drops of dilute sulphuric acid (one part of the acid to six of water). If sugar be present the spot becomes deep brown or black, from the deposition of carbon. This test is a delicate one, but not conclusive as to the presence of sugar, for albumen will yield a similar result.

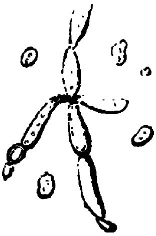
(5.) *Capezzuoli's test*, with *hydrated oxide of copper and liquor potassæ.*—Drop into the urine a few grains of the blue hydrated oxide of copper, and then add a small quantity of liquor potassæ, so as to render the liquid alkaline. If sugar be present the fluid becomes of a reddish colour, and in a few hours the fragments of the oxide become yellow, first at the edges, and then through the whole mass; this arises from the reduction of the oxide to the form of suboxide.

(6.) *Crystallization Test.*—Evaporate the urine to the consistence of a thick syrup, and digest the residue in hot alcohol. Pour the cooled alcholic solution into a large test tube, and allow it to evaporate spontaneously. The sugar will crystallize on the sides of the glass in white granules.

(7.) *Fermentation Test.*—On adding yeast to diabetic urine, and raising the temperature to 80°, effervescence takes place, a brisk discharge of gas ensues, and a yellowish liquid is formed, which has the odour of beer, and yields an alcoholic liquid by distillation. One part of sugar in 1,000 parts of healthy urine of the density 1,030 may be detected by this means. The test was first suggested for animal fluids by Gmelin, and for urine by Dr. Christison.

(8.) *Torula Test.*—Expose the urine for a few hours to a temperature above 70°. A drop of the urine taken from the scum which covers the surface, and placed under the microscope, exhibits oval vesicles, which rapidly grow into a species of conferva, to which the term *torula* has been given.

Fig. 22.



506. The quantity of sugar in the urine may be readily determined with a fair approach to accuracy, by the fermentation test, as suggested by Dr. Christison: "Every cubic inch of carbonic acid gas given off by fermentation, corresponds in round numbers with one grain of sugar, or forty-seven of gas to forty-five of sugar. Hence the quantity of sugar may be easily found by filling a graduated tube with

mercury, leaving space for a little more than the requisite quantity of urine, which is then to be introduced; next filling up what remains of the space with yeast, and with the finger on the open end of the tube, reversing the tube in a vessel of mercury, and then placing the apparatus where it may be exposed to a heat of 70° or 80° for twelve or twenty-four hours."

507. *Bile.*—Urine containing bile is of a deep brown colour, and if the quantity be considerable, of a bitter taste. The bile may be detected by either of the following tests:—

(1.) *Nitric Acid Test.*—Place a small quantity of the urine on a white surface of porcelain, and add a drop of nitric acid. If bile be present, green and pink colours will show themselves round the test.

(2.) *Pettinkoffer's Test, Sulphuric Acid and Sugar.*—Place, as before, a small quantity of the urine on a white surface of porcelain, and add to it a drop or two of strong sulphuric acid. While the mixture is hot add a drop of strong syrup. If bile be present a fine purple colour will be produced.

(3.) A third test has been proposed by Schwertfeger, which consists in throwing down the bile as a yellow precipitate, by acetate of lead, and dissolving the precipitate in alcohol acidulated with sulphuric acid. A green solution is obtained to which Pettinkoffer's test may be applied.

Tests 1 and 2 are most expeditious, and, therefore, to be preferred.

508. *Kiestein.*—This, though not peculiar to pregnant women, is found in the great majority of cases of pregnancy. It consists of a film of fat, a peculiar matter resembling casein, and crystals of ammoniaco-magnesian phosphate. It forms upon the surface of the urine in periods varying from thirty hours to eight days, but most frequently on the third day. The urine is either neutral or ammoniacal at the time of its formation After standing some time the pellicle breaks up and falls to the bottom of the vessel. The sediment has a disagreeable, pungent, odour of decayed cheese. Under the microscope the pellicle is seen to consist of minute opaque corpuscles, blended with crystals of ammoniaco-magnesian phosphate.

509. *Blood.*—Blood is sometimes voided with the urine in small defined clots, which are readily identified as such on mere inspection, but, in other cases, the urine is tinged by it of a bright red, or of a brown or bistre red colour. The colour alone is not conclusive, as other colouring matters produce similar appearances. The nature of the colouring matter is, however, easily ascertained, either by the discovery of blood-corpuscles under the microscope, or by the effect of heat and nitric acid, which throw down a dirty-brown coagulum, consisting of albumen blended with the colouring matter. The urine also becomes of a bright red colour when treated with a concentrated solution of common salt.

Blood Corpuscles.—When not dissolved in the urine, the blood-corpuscles form a dark brown-red sediment, in which their forms (see annexed engraving) may be discovered by the microscope.

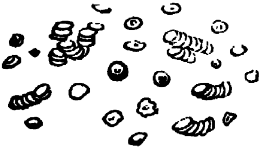


Fig. 23.

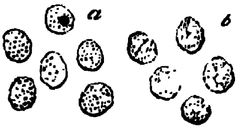
510. *Fibrin.*—This substance is voided in the form of casts of the tubes, as a constituent of clots of blood, or diffused through the urine in a state of solution. Coaguli and flocculi of fibrin are readily distinguished from mucus by their amorphous appearance under the microscope and the absence of epithelial scales.

511. *Albumen.*—Tests—heat, and nitric acid. These should always be employed at the same time. For heat will throw down the phosphates if they are in excess, and the acid may render the urine turbid if it contain any essential oil, as that of cubebs or copaiba. Should the phosphates in excess co-exist with an essential oil, both heat and nitric acid would throw down a white precipitate. The addition of an acid will dissolve the phosphates; the essential oil may be separated by ether, after which the urine will have its usual reaction. Corrosive sublimate in solution is also a delicate test for albumen, but the two tests just mentioned are those commonly employed.

512. *Mucus.*—A small quantity of mucus is present in healthy urine, but not so as to affect its transparency. In disease it may be blended with it in any proportion from a slight cloud to a quantity sufficient to cause it to pour from one vessel to another as a viscid ropy fluid; and when the quantity of mucus is considerable, and the result of acute inflammation of the mucous membrane of the bladder, and especially when it is blended with an excess of phosphates, it may form a distinct deposit closely resembling pus. Urine containing mucus has generally an alkaline reaction, and is not coagulated by heat or nitric acid, unless albumen be also present. Acetic acid coagulates it.

513. *Pus.*—Urine containing pus is commonly either acid or neutral; and, on standing, deposits the pus as a distinct cream-coloured layer, which may be readily diffused through the fluid by agitation. The deposit is not dissolved by acetic acid, but is rendered more consistent by liquor potassæ, and when shaken with ether, yields a quantity of fat. The urine freed from its purulent deposit is coagulated by heat and nitric acid.

Fig. 24.

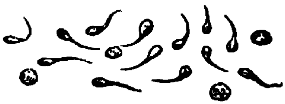


In alkaline urine pus assumes something of the viscidity of mucus. Under the microscope pus presents a number of opaque spherical granular globules, consisting of a cell-membrane enclosing nuclei, oil globules, and minute granules. The addition of acetic acid renders the envelope transparent and the nuclei more distant, as in the subjoined engraving (Fig. 24), in which *a* represents the ordinary appearance of the pus granule, and *b* of the same granule on the addition of acetic acid. Mucus presents similar microscopic appearances, but the particles are not so distinctly granular.

514. *Diagnosis of Pus and Mucus.*—Much stress was formerly laid on the importance of distinguishing between pus and mucus and many methods were devised for effecting that object. It is now well understood that though there is great difference between healthy mucus and pus, there is very little difference between pus and mucus thrown out by an inflamed membrane. The only satisfactory means of distinction which we possess is the application of heat or nitric acid to the urine containing the pus or mucus respectively. Urine containing pus is coagulated by these reagents, while urine containing mucus is not, unless it also contain albumen derived from some other source.

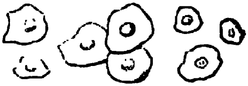
515. *Semen.*—Occasionally the seminal fluid which lines the urethra after emission becomes washed away by the urine, and may be recognised in it by the peculiar appearance of the spermatozoa. (Fig. 25.)

Fig. 25.



516. *Epithelium.*—The epithelium scales which are found blended with pus and mucus, and are often discharged in large quantities, especially by persons suffering from the secretion of oxalate of lime, are easily recognised by their well-known microscopic characters. (Fig. 26.)

Fig. 26.



517. *Casts of the Urinary Tubes.*—Considerable importance has been attached by recent inquiries, and especially by those of Dr. George Johnson, to a microscopic examination of the casts of the urinary tubes. The following summary embodies the leading conclusions to which Dr. Johnson's investigations have led him.*

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* I embrace this opportunity of acknowledging my obligations to Dr. Johnson for this summary, and of recommending a careful perusal of the article *Ren* in the Cyclopædia of Anatomy and Physiology, and of two papers on the subject of disease of the Kidney in the 29th and 30th volumes of the Medico-Chirurgical Transactions. The very interesting and important views embodied in these papers are confirmed and extended in Dr. Johnson's work on diseases of the Kidney.

All the forms of renal disease which have not a purely local origin, such as mechanical injury from a blow on the loins, the irritation of a calculus, or retention of urine in consequence of stricture, are the result of an effort made by the kidney to separate from the blood some morbid and noxious material. Amongst the most common causes of renal disease are the fever poisons, particularly that of scarlatina, and more rarely that of measles, of erysipelas, or of typhus. A morbid condition of blood connected with gout is another frequent cause of chronic renal disease; in other cases imperfect nutrition of the blood consequent on an insufficient supply of animal food, and sometimes an imperfect action of other excretory organs, such as the skin or liver, will excite disease in the secretory structure of the kidney. One form of disease may sometimes be traced to the scrofulous diathesis. Lastly, a temporary disease of the kidney is sometimes produced by some irritant accidentally introduced into the blood, such as oil of turpentine or cantharides. In all these cases the morbid products are thrown into the tubes of the kidney, and portions of them being continually dislodged by the urine flowing through the tubes, appear in the secretion in the form of cylindrical casts. Now, as each form of disease in the kidney is attended by a peculiar and characteristic kind of cast in the urine, it follows that a careful examination of these bodies is as essential for the formation of an exact diagnosis in cases of renal disease as an auscultatory examination of the chest is for the detection of diseases within that cavity. It is not sufficient to have detected albumen in the urine, but the secretion must be examined microscopically before an opinion as to the nature of the disease and its probable result can, with any confidence, be given. The casts may best be examined with a magnifying prism of about 200 diameters. The chief varieties are here represented.

Fig. 27 represents an *epithelial cast*, composed of fibrin, entangling epithelium and blood corpuscles. This form of cast indicates the existence of that disease which has been called "acute desquamative nephritis." It occurs not uncommonly as a consequence of scarlatina. The fever poison produces a desquamation of epithelium from the inner surface of the kidney tubes, analogous to the desquamation of epidermis from the skin, which occurs more constantly and naturally as one of the consequences of the fever.

Fig. 27.

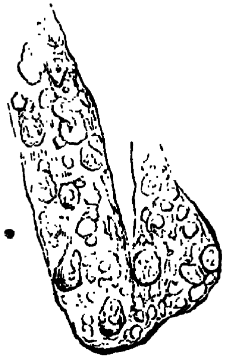


Fig. 28

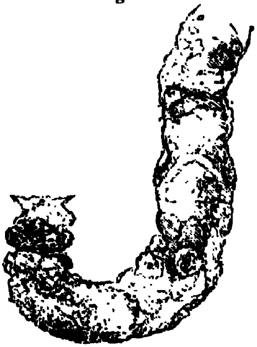


Fig. 28 represents one of the *granular casts*, which are characteristic of "chronic desquamative nephritis." These casts are composed of fibrin, with particles of disintegrated epithelium; they commonly exist in the urine of those who have had numerous attacks of gout, and they may often be detected long before any other sign of renal disease. Albumen appears at a later stage, and is therefore a sign of less value in this form of disease, since the probability of a cure depends, in a great degree, upon the disease being detected in an early stage.

Fig. 29.

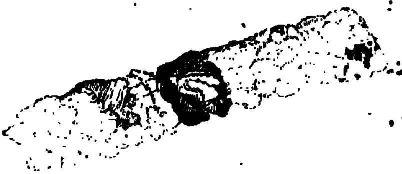


Fig 29 represents a peculiar form of casts which from their appearance may be called *waxy*. This material is sometimes deposited in the tubes in the advanced stage of chronic nephritis, but it sometimes occurs in an acute form as a primary disease of the kidney.

Fig. 30.

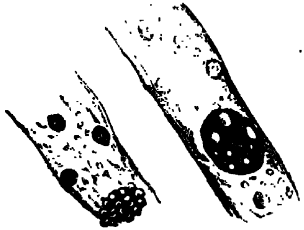


Fig. 30 represents casts composed of fibrin, entangling oil globules and epithelial cells gorged with oil. They may be called *oily casts*, and they indicate the existence of fatty degeneration of the kidney, the most serious and incurable form of Bright's disease.

Fig. 31.

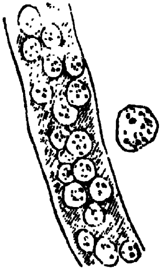


Fig. 31 represents *purulent casts*, that is to say, casts of fibrin entangling pus cells, from the urine of a man who had suppurative nephritis; a very serious and often rapidly fatal form of disease.

Fig. 32.

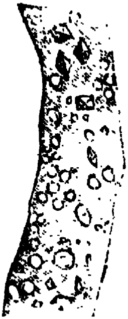


Fig. 32 represents *blood casts*, from the urine of a man who had strangury and hæmaturia, after taking oil of turpentine. The blood having been moulded in the kidney tubes, of course affords unequivocal evidence that the hæmorrhage was renal and not vesical. The crystals attached to the cast are crystals of oxalate of lime.

518. It is sometimes important to be able to form an opinion on the spot, by inspection and the application of one or two simple tests, as to the character and composition of an urinary deposit. The deposits which we are most likely to encounter may be classed as follows:—

(1.) Red crystalline sediment—Uric acid with colouring matter of the urine.

(2.) White crystalline sediment—Triple or ammoniaco-magnesian phosphate.

(3.) White amorphous sediment—Triple phosphate, and phosphate of lime.

(4.) Pink sediments—Urate and phosphate of ammonia.

(5.) Yellowish or nut-brown sediment—Urate of ammonia and soda, earthy phosphates, and colouring matter of urine.

(6.) Reddish brown or lateritious sediment—Alkaline urate (chiefly urate of soda,) earthy phosphates (occasionally), colouring matter of urine, and alkaline purpurate.

(7.) Oxalate of lime.

(8.) Carbonate of lime } Very rare.
(9.) Cystic oxide }

(10.) Red particles of the blood, pus, mucus, &c.

519. The substances contained in 2, 3, 4, 5, and 6, consist of a mixture of colouring matter with the alkaline urates and the earthy phosphates in variable proportions. These are easily distinguished, both from each other and from certain secretions which may resemble them. This is done by shaking the sediment up in the urine, and applying heat to the turbid fluid. If the sediment dissolves, it consists of the alkaline urates, and chiefly of urate of ammonia; if, on the other hand, the fluid remains turbid, the deposit consists of the earthy phosphates, or of organic matter in the form of pus or mucus. These may be readily distinguished by the addition of hydrochloric acid, which dissolves the phosphates, but not the organic matters. If

urine containing urates also holds albumen in solution, the urine first becomes clear, and then turbid on the application of heat.

520. In cases of diabetes, and in other morbid states in which the urine is loaded with matter in excess or foreign to its normal composition, it is desirable to be able to estimate the quantity of solid matter which the urine contains. This may be done by multiplying the excess of the specific gravity of the urine above that of water by the weight of the urine, and the product by 0·00233. If the weight of given quantities of urine of different specific gravities be known, the amount of solids may be directly calculated from the measured quantity, and in this way we may determine the solid matter passed in twenty-four hours, provided the urine submitted to examination be an average of that passed during the entire period. To obviate the necessity for calculation, two tables are given, of which the first presents the quantity of solid matter contained in 1000 grains of urine of different densities; and the second, the weight of one pint of urine. The mode of using the tables will be readily seen from a single example. Suppose a patient to pass, in twenty-four hours, three pints of urine of the specific gravity of 1·030, it is required to ascertain the weight of solid matter voided in this period. 1000 grains of urine, specific gravity 1·030, contain by Table I. 69·90 grains of solid matter, and a pint of urine of the same specific gravity weighs, by Table II., 9012 grains. Hence $\frac{69\cdot9\times9012}{1000}$ or 629·9 grains is the quantity of solid matter contained in each pint of urine; and 629·9 × 3, or 1889·7 grains, is the total weight of solids voided in the twenty-four hours. This calculation will give a sufficiently near approximation to the actual weight of saccharine matter in cases of diabetes mellitus.

TABLE I.

Solids in 1000 *Grains of Urine of different densities.*

Specific Gravity.	Solids.	Specific Gravity.	Solids.
1·001	2·33	1·016	37·28
1·002	4·66	1·017	39·61
1·003	6·99	1·018	41·94
1·004	9·32	1·019	44·27
1·005	11·65	1·020	46·60
1·006	13·98	1·021	48·93
1·007	16 31	1·022	51·26
1·008	18·64	1·023	53·59
1·009	20·97	1·024	55·92
1·010	23·30	1·025	58·25
1·011	25·63	1·026	60·58
1·012	27·96	1·027	62·91
1·013	30·29	1·028	65·24
1·014	32·62	1·029	67·57
1·015	34·95	1·030	69·90

Solids in 1000 Grains of Urine of different densities.

Specific Gravity.	Solids.	Specific Gravity.	Solids.
1·031	72·23	1·041	95·53
1·032	74·56	1·042	97·86
1·033	76·89	1·043	100·19
1·034	79·22	1·044	102·52
1·035	81·55	1·045	104·85
1·036	83·88	1·046	107·18
1·037	86·21	1·047	109·51
1·038	88·54	1·048	111·84
1·039	90·87	1·049	114·17
1·040	93·20	1·050	116·50

TABLE II.

Weight of a Pint of Urine of different densities.

Specific Gravity.	Weight of one Pint.	Specific Gravity.	Weight of one Pint.
1·010	8837	1·031	9021
1·011	8846	1·032	9030
1·012	8855	1·033	9038
1·013	8863	1·034	9047
1·014	8872	1·035	9056
1·015	8881	1·036	9064
1·016	8890	1·037	9073
1·017	8898	1·038	9082
1·018	8907	1·039	9091
1·019	8916	1·040	9099
1·020	8925	1·041	9108
1·021	8933	1·042	9117
1·022	8942	1·043	9126
1·023	8951	1·044	9134
1·024	8960	1·045	9143
1·025	8968	1·046	9152
1·026	8977	1·047	9160
1·027	8986	1·048	9169
1·028	8995	1·049	9178
1·029	9003	1·050	9187
1·030	9012		

3. THE ABDOMEN AND ORGANS OF DIGESTION.

521. *The Abdomen.*—To facilitate description, the chest and abdomen have been divided into a number of distinct parts or regions by imaginary lines drawn from fixed points. (See Figures, pp. 130, 131.)

This division is effected, in the first place, by four horizontal lines extending round the trunk of the body—the first (*a a*) at the level of the clavicles, the second (*b b*) at the level of the point of the ensiform cartilage, the third (*c c*) at the level of the cartilages of the tenth ribs,

Fig. 33.

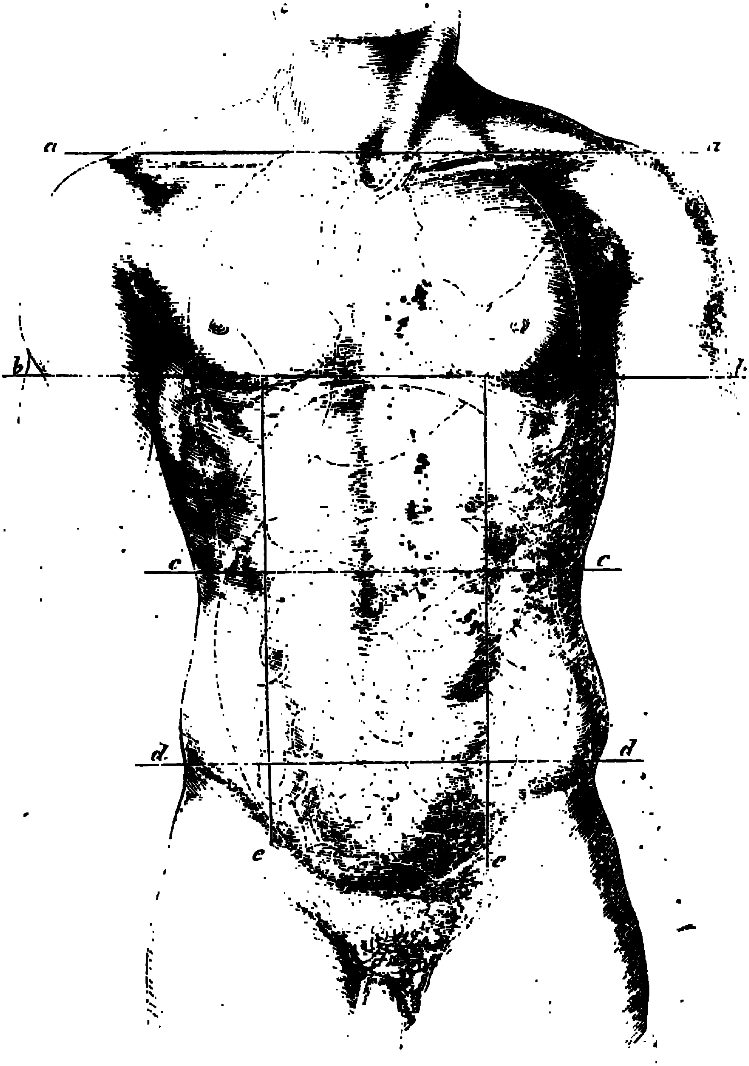
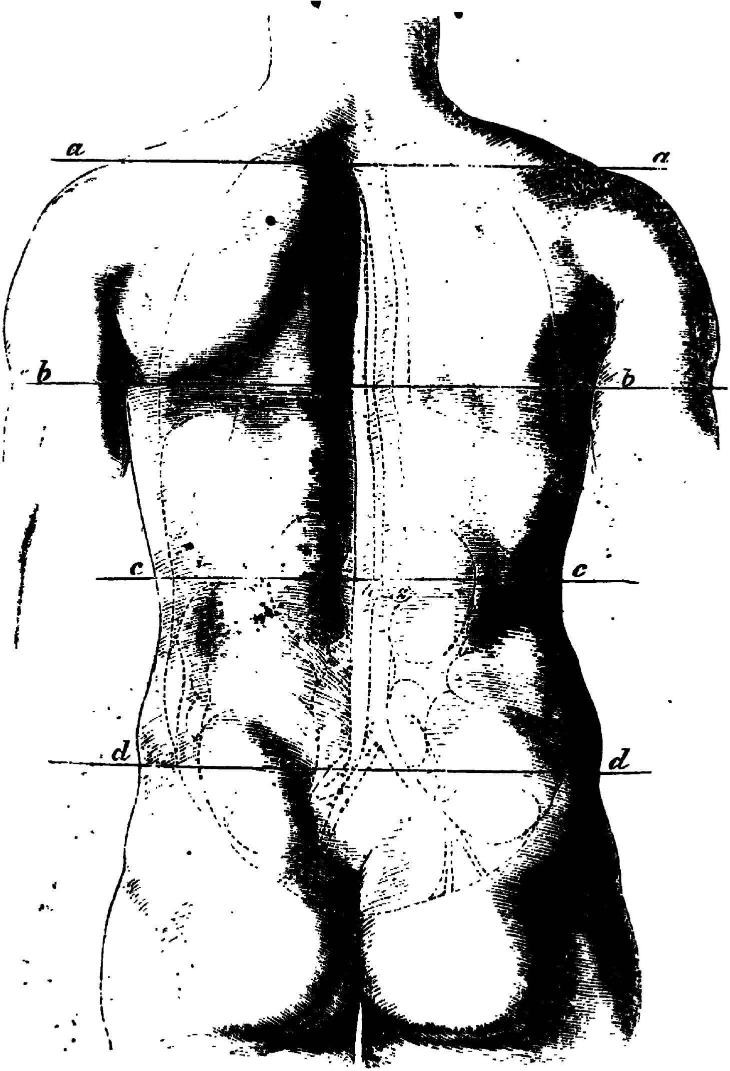


Fig. 34.



and the fourth (*d d*) at the highest points of the crests of the ilia. The abdomen is further subdivided into seven regions (three central and four lateral) by two vertical lines (*c c*) springing from the middle point of Poupart's ligament, and meeting the horizontal line (*b b*).

The three central regions thus formed are named, in the order from above to below, the epigastric, the umbilical, and the hypogastric; the four lateral regions, taken in the same order, are, the right and left hypochrondriac, and the right and left iliac. The portion of the abdomen immediately above the line of Poupart's ligament is commonly known as the inguinal region.

522. The organs situate in each of these regions are as follow:—The *epigastric* contains the middle portion of the stomach with its pyloric extremity, the left lobe of the liver, the lobulus spigelii and hepatic vessels, the head of the pancreas, the cœliac axis, the semilunar ganglion, and part of the vena cava, aorta, vena azygos, and thoracic duct. The *umbilical* contains the omentum and mesentery, the transverse portions of the duodenum and colon, and some convolutions of the jejunum. The *hypogastric* is occupied by the bladder and a portion of the omentum and small intestines. Behind the bladder lies the uterus in the female, and the rectum in the male. The *right hypochondriac* region contains the right lobe of the liver and the gall-bladder, part of the duodenum and ascending colon, the renal capsules, and part of the right kidney: the *left* contains the large end of the stomach, the narrow extremity of the pancreas, the spleen, part of the colon, the renal capsules, and upper part of the left kidney. The *right iliac* region contains the cæcum, with the termination of the ilium and the commencement of the colon; the *left*, the sigmoid flexure and part of the descending colon.

523. The posterior regions, formed by continuing the horizontal lines just described, are divided by a vertical line following the direction of the spine into four regions, the right and left dorsal, and the right and left lumbar. Of these four regions, the *right and left dorsal* contain the upper portions of the kidneys. The *right lumbar* contains the cæcum and lower portion of the right kidney; the *left*, the sigmoid flexure of the colon, and lower portion of the left kidney.

524. When any of the organs are distended or enlarged, they encroach upon surrounding parts, and occupy adjoining regions. Thus, the distended stomach or bladder may encroach on the umbilical region; the distended colon may rise into the epigastric; and the enlarged liver or spleen may descend into the right or left iliac region.

525. The *size and shape* of the abdomen vary with age and sex. In the child, the abdomen is large; in the spare adult, small; in the female it is naturally pendant, presenting an enlargement in the hypogastric region. In persons of sanguine and nervous temperaments, it is small; in the phlegmatic, and in the melancholic, it is more

commonly large. It varies in size, in the same person, with the full or empty state of the stomach, the quantity of gas contained in the intestines, and the distension of the bladder. Pregnancy, ascites, ovarian dropsy, tympanites, hydatids, enlargement of the liver or spleen, and various morbid growths attached to the several organs, may also greatly increase the size and alter the shape of the abdomen.

526. In examining the abdomen, we employ three methods—*inspection*, *manual examination*, and *percussion*.

527. By *inspection* we ascertain the size, form, and movements of the abdomen. The size is increased by any of the causes just specified; the form, too, is altered, either throughout the entire cavity, or in parts, according as the cause is extensive or limited. The history of changes of form is very important. Thus, the gradual, uniform, and central enlargement of pregnancy, the lateral enlargement in the first stage of ovarian dropsy, and the equal and gradual growth of ascites, form important means of diagnosis.

528. The movements of the abdominal parietes are not less important, especially those of respiration. Thus, in peritoneal inflammation, respiration is performed by the chest alone; and the same absence of motion in the abdomen is seen in severe rheumatic affections of its muscles. On the other hand, in pleuritis and in severe rheumatic affections of the muscles of the chest or of the diaphragm, the respiration is performed chiefly by the muscles of the abdomen. Again, when the abdomen is greatly distended from any cause, the action of the abdominal muscles is nearly suspended, and respiration is performed by the chest and diaphragm. When the distension is still greater, the viscera are pressed against the diaphragm, and respiration is performed solely by the muscles of the chest.

529. By the *touch*, we gain further information as to the size, form, shape, and degree of tension of the abdomen. We also ascertain its temperature and degree of sensibility. The *temperature* should be compared with that of other parts of the body. In acute inflammation of the peritoneum, and in severe febrile affections, accompanied with abdominal inflammation, it is greatly increased, and has a peculiar pungency.

530. In ascertaining the degree of *sensibility*, pressure should first be made gently, and with the open hand. If the slightest touch produces pain, and that pain is accompanied by inflammatory fever, the disease is in the peritoneum; but if fever is absent, the pain is neuralgic, and will often be found associated with a tender state of the spine. If a slight touch produces no pain, we apply stronger pressure. If deep and moderately strong pressure occasions rather a feeling of soreness than of acute pain, we may conclude that inflammation of the mucous membrane of the stomach or intestines is present. Direct pressure of this kind sometimes produces very slight pain even when the peritoneum is inflamed; in such cases, a lateral

pressure, causing the peritoneum to slide over the intestines, occasions extreme pain. In colica pictonum, strong pressure relieves pain, and forms an important means of diagnosis. Muscular pain, also, is relieved by gentle pressure, gradually increased; but, on the sudden removal of the pressure, the muscles are thrown into action, and acute suffering is produced. But even during the application of the hand, pain may occur, from the sudden contraction of the muscles in the act of expiration. Hence the necessity of applying this diagnostic mark with some caution. Muscular pain, too, is rarely accompanied by much constitutional disturbance, and like neuralgia of the skin, is often dependent on, or associated with, an irritable state of the spinal marrow.

531. In applying pressure to the abdomen, we should always mark the expression of the countenance, as this is much more to be depended on than the answers of the patient, especially in cases accompanied by typhoid symptoms, or when the brain is affected. When great tenderness exists in the abdomen, the patient is apt to throw the muscles into rigid tension, so as to shield the contents of the cavity from pressure. In this case, we must wait till the contraction passes off, and seize the opportunity of applying pressure when the attention has been diverted, or while the patient is speaking.

532. If in the examination of the abdomen any tumour has been discovered, or we are anxious to ascertain the state of any of its contents more accurately, it will be necessary to relax the muscles of the abdomen, by placing the patient on the back, with the head slightly raised and bent forward, the arms extended by the sides, the thighs bent nearly at right angles on the trunk, the knees apart and turned outwards, and the feet resting on the bed in contact with each other. When so placed, the patient must be desired to use as little muscular effort as possible, and the attention must be diverted from the examination which is going on. In this relaxed state of the abdominal parietes, the position of tumours, and the extent of the enlargement which the viscera may have undergone, are readily ascertained.

533. Another mode of examination is by *percussion*. This may be performed either directly with the points of the fingers, or by the intervention of a plate of ivory or wood, or of a finger of the left hand. Applied in this latter manner over any of the hollow viscera containing air, percussion elicits a clear sound. This sound is somewhat modified, if the air be mixed with fluid. Percussion, on the other hand, elicits a dull sound when applied over any of the solid viscera, over collections of fluid, over the hollow viscera when entirely free from air, or over solid tumours formed within the cavity.

534. Percussion combined with touch may be employed in detecting the presence of fluid. This is best done in the upright posture. It consists simply in placing the palm of the hand on one side of the

abdomen, with a firm but gentle pressure, and tapping sharply with the other hand on the part of the abdomen directly opposite to it. If fluid be present, a peculiar vibrating shock is experienced, which is not easily mistaken.

535. Percussion with the points of the fingers is useful in distinguishing muscular pains of the abdomen. A slight touch throws the muscles into action, and produces pain. This sign, combined with the absence of pain on firm pressure gradually applied, and the recurrence of the pain on the sudden removal of the pressure, together with the acute pain produced by every movement of the affected muscles, distinguishes muscular pains from those arising from disease of deeper-seated parts.

536. *Organs of Digestion.*—The condition of the alimentary canal is revealed in part by the state of the tongue; in part by alterations in the functions of the stomach and intestines, such as nausea, vomiting, and purging; and in part by the character of the substances rejected.

537. The *tongue* does not present the same appearance in all healthy persons. In some it is habitually clean, in others slightly furred; in some, florid, in others pale; in some compact and firm, in others flaccid and indented by the teeth; in some it is protruded in a relaxed state, in others strongly contracted and drawn to a point. Even in the most healthy persons it is covered with a thin white fur in the morning before taking food.

538. In disease, the tongue presents a great variety of appearances. It is swollen in inflammation of the tongue itself, in severe diseases of the adjacent parts, in salivation from mercury, and in malignant disease: on the other hand, its size is diminished where much emaciation is present. Its *form* varies with the mode in which it is protruded. Its *colour* coincides, to a certain extent, with that of the general surface. Thus it is florid in plethora, pale in anæmia, and livid in certain diseases of the heart and lungs which greatly affect the respiration. The colour of the tongue also depends upon the state of the digestive organs. Thus it is universally red, or red at the tip or edges, or both, in some cases of acute inflammation of the mucous membrane of the stomach and intestines. It is also morbidly red and tender in some forms of fever, in well-marked cases of scarlatina, and in typhus fever after the disappearance of the fur.

539. The *papillæ* of the tongue are elongated and florid, and protrude through the white coating of fur in scarlatina; and a similar appearance exists in some cases of acute dyspepsia.

540. A *fur* collects on the tongue in almost all severe diseases. Thus the tongue is loaded with a white fur in the first stage of fever, in catarrh, in quinsy, in most severe inflammations, and in acute rheumatism. In more advanced stages of fever, a thick brown or black

coating collects, or the tongue is dry, parched, and tender. A brown, dry fur exists in cases of local irritation, the tongue becoming moist and clean as the irritation subsides. In dyspepsia, the appearance of the tongue is very variable. Sometimes a thick fur collects at the base of the tongue, while the edges and apex are of a bright red; sometimes the fur extends over the whole surface, and is accompanied by indentations formed by the teeth, or by deep transverse cracks. In constipation, the tongue is often covered with a brown fur; at other times, it presents no unusual appearance.

541. The mode in which the tongue is *protruded* is often characteristic. It is tremulous in extreme debility, or under the influence of fear, as also in cases of idiopathic fever with debility. It is protruded with difficulty when dry; slowly and hesitatingly, in diseases accompanied by stupor, in which cases it is withdrawn after an interval, and as if in consequence of deliberation. In partial paralysis the tongue is protruded either towards the sound or the affected side of the face.

542. The *gums*, from their proximity to the tongue, may be mentioned here, though they afford signs rather of the state of the circulation than of the digestive organs. The gums are florid in plethoric states of the system; pale in anæmia; livid in cases where the function of respiration is much impeded; swollen and dark in scurvy and purpura hæmorrhagica, in which diseases they bleed on the slightest touch; swollen with an inflamed line in cases of salivation; marked with a blue line at the margin of the teeth in poisoning by lead.

543. The *lips* and lining membrane of the mouth, like the gums, inform us as to the state of the circulation. They are pale in anæmia. They are also dry and parched where the tongue is similarly affected. Aphthæ occur on all these parts as an idiopathic affection, especially in young children, and towards the close of febrile and inflammatory affections. An herpetic eruption on the lips is a common acompaniment of severe catarrh, and is often useful as a diagnostic mark.

544. The existence or absence of thirst, and the odour of the breath, are points to be attended to in inquiring into the state of the digestive organs. The foul odour of the breath in some cases of constipation, in many forms of dyspepsia, in cases of scurvy, in advanced stages of typhus fever, and especially in gangrene of the lungs, should not pass unnoticed. The odour of spirits, laudanum, &c., may also assist us in certain doubtful cases. Offensive breath is not of uncommon occurrence in persons in the enjoyment of a fair average state of health, and depends upon very obscure causes.

545. The functions of the stomach and intestinal canal suffer more or less in almost all diseases, whether affecting the canal itself, or other parts of the system. In all febrile affections, in the more severe inflammatory diseases, in affections of the head, and in sudden and violent shocks to the system, the stomach sympathises. Loss of

appetite is the most common consequence of disease, whether of the stomach or of other important organs.

546. *Vomiting* occurs in inflammation of the mucous membrane of the stomach, by whatever cause produced; in obstruction to the passage of the food through the pylorus, as in cancer of the stomach; in permanent obstruction to the passage of the fæces through the intestines, as in ileus and strangulated hernia. It is the first effect of concussion of the brain, and a frequent precursory symptom of apoplexy. It accompanies the passage of gallstones, and is commonly present in severe inflammation of the kidneys. It is also one of the most constant symptoms of pregnancy, and is of very frequent occurrence in delicate females. The substances rejected from the stomach are food, mucus, clear acid liquids, bile, blood, pus, and in some cases, fæces. The blood, which is usually dark-coloured and in clots, sometimes with and sometimes without food, is often vomited in very considerable quantities.

547. The *bowels* are variously disordered; sometimes confined, from torpor, from the absence of their natural stimulus, or from mechanical obstruction; sometimes relaxed, from inflammation of the mucous membrane, whether caused by previous constipation, unwholesome food, purgative medicines, or irritant poisons. Diarrhœa is also a common consequence of ulceration of the intestines in typhus fever; it is a frequent occurrence in pulmonary consumption, uniformly present in advanced stages of tabes mesenterica; and very prevalent during the heats of summer. Strong mental emotions also sometimes give rise to diarrhœa. In union with vomiting it constitutes English and Asiatic cholera, and is present in all cases of irritant poisoning.

548. The alvine discharges may consist of mucus, tenacious lymph, or pus, as in inflammations of the mucous membrane of the canal, the nature of the secretion depending on the degree of the inflammation; or they may consist of blood poured out by the vessels of the intestines generally, or by the enlarged veins of the rectum (piles). They may consist chiefly of ill-digested food, which happens in tabes mesenterica, or they may contain an unusual quantity of fat, as in disease of the pancreas.

549. The evacuations may be pale from the absence of bile; unusually yellow from its excess; green, as often happens in children; dark and offensive, from the long retention of feculent matter, or from morbid secretions of the liver. They often contain portions of hardened fæces or scybala. They assume an unusually yellow colour under the use of mercurial preparations; mineral acids in large doses impart to them a green colour; and preparations of steel turn them black, as does also the admixture of blood in considerable quantity.

It is important in all doubtful cases to distinguish those discharges which flow from the general surface of the intestines from such as are the product of local disease in the rectum. When, therefore, pus or blood is discharged with the motions, the presence or absence of tenesmus, piles, or fistula, should be ascertained.

4. THE CHEST, AND THE ORGANS OF RESPIRATION AND CIRCULATION.

550. An examination of the external conformation of the chest must precede all inquiries into the diseases of parts contained within it. To facilitate such examination, the chest, like the abdomen, has been divided into regions, by lines drawn from fixed points. (See Figures, pp. 130 and 131.) The two horizontal lines (*a a* in the line of the clavicles, and *b b* on the level of the ensiform cartilage), joined by a vertical line bisecting the sternum, divide the chest anteriorly into two principal regions, of which certain parts are designated by characteristic names. The portions which lie beneath the clavicle are known as the subclavian regions, and the lower portions of the neck above the clavicles as the supra-clavicular regions. The part of the chest marked by the nipples is sometimes called the mammary region, and the armpit is known as the axillary region.

551. On the back part of the chest the scapular, intra-scapular, and infra-scapular, or superior dorsal regions, correspond—the first to the scapula of either side, the second to the space between the two scapulæ, and the third to that portion of the chest which is immediately below the angle of those bones.

552. The size, shape, and movements of the chest, may be ascertained by *inspection*, *manual examination*, and *measurement*.

553. *Inspection.*—A well-formed chest is large in all its dimensions, uniformly rounded, and free from all irregularity in the bony parietes. The spine should be straight, or, in very strong men, especially those who use the right arm much, curved almost imperceptibly towards the right side. The chest appears at first sight symmetrical; but when measured, the right side will be found larger than the left by about half an inch, and there is naturally somewhat more fulness above and immediately beneath the left than the right clavicle, which results from the left lung rising higher than the right. The chest is wider and longer in males than in females; but deeper in females than in males. Women are also more subject than men to distortions of the chest and spine.

554. The first glance at the chest enables as to form a judgment of its size. A more minute examination is necessary to detect deviations from its accustomed form. The chief distortions affecting both sides of the chest alike are those arising from the use of stays in the female, and from constrained posture in the male. Of the latter, the most remarkable is the flattened chest of the shoemaker. Alterations in the shape of both sides of the chest also arise from diseases affecting equally both lungs; such as tubercles, leading to contraction, especially in the sub-

clavian region, and dilatation of the pulmonary cells (emphysema), causing a considerable enlargement chiefly about the middle of the chest. Alterations in the shape of one side only, or of a limited portion of one side, may arise from more than one disease of the corresponding lung. Pleuritis, both acute and chronic, causes an enlargement of the affected side, but in certain cases the same disease produces contraction. In hydrothorax, also, and in pneumothorax, the size of the affected side is increased. When the dilatation is extreme, the intercostal spaces are raised to a level with the ribs. More partial changes arise from circumscribed pleurisy and limited adhesions. In advanced cases of phthisis, the position of a cavity is often indicated by the falling in of one of the intercostal spaces. Certain changes in the size and shape of the chest also arise from diseases of the heart and of the large vessels.

555. Inspection also enables us to ascertain the character of the respiration; whether tranquil or hurried, easy or difficult; whether abdominal, as in acute pleurisy or acute pleurodyne, or thoracic, as in acute diseases of the abdomen, and severe rheumatic affections of the abdominal muscles or of the diaphragm. The character of the heart's impulse may also be ascertained by inspection of the chest.

556. *Manual Examination.*—By this, as by inspection, we ascertain the development of the muscles, the thickness of the parietes of the chest, the presence of obesity or emaciation, and of œdema or emphysema of the integuments. Heat and soreness of the skin, the existence of local tenderness, from whatever cause, or of muscular pain, may be ascertained by the same means. The extent and character of the heart's impulses may also be ascertained by the application of the hand, and it is usual to apply the two hands to the chest when we wish to ascertain the comparative freedom of the respiration on the two sides.

The skin of the chest is preternaturally hot in pneumonia, and in all inflammatory affections of the lungs.

Firm pressure in the intercostal spaces often causes pain when the pleura is inflamed, either generally or partially. This partial tenderness occurs in phthisis pulmonalis, when the pleura covering a cavity is inflamed, or when a collection of pus is making its way externally.

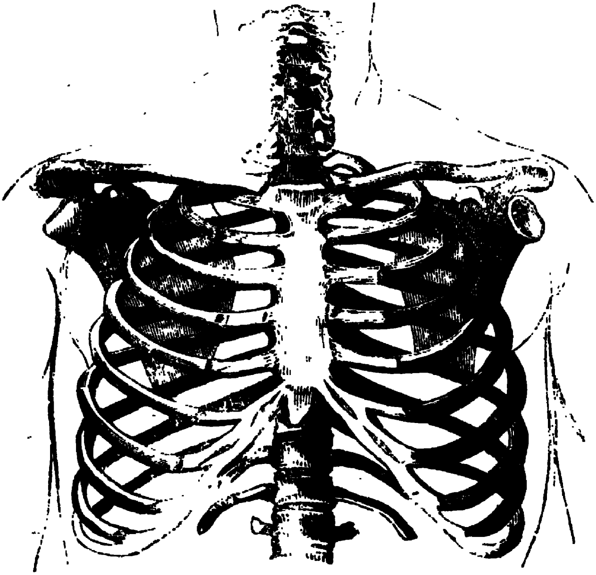
557. Muscular pains exist in pleurodyne, whether idiopathic or the consequence of violent efforts in coughing. Such pains are distinguished by slight percussion with the points of the fingers, by the movements of the arms or trunk, by the sudden and sharp pain produced by a deep inspiration, and by the absence of pain on firm and gradual pressure, with its recurrence when the support is suddenly removed. Percussion with the fingers throws the muscles visibly into action through the whole length of their fibres, and, in certain cases, causes remarkable partial and transverse contractions, which are best seen in advanced cases of consumption. These partial contractions are not confined to the muscles of the chest, but may be excited in the biceps and in other large muscles.

558. *Measurement.*—This is effected by means of a graduated tape, stretched from one point of the chest to another. It is principally employed to ascertain the relative size of the two sides of the chest. For this purpose, one end should be applied to the spine, and the tape carried horizontally round the two sides of the chest; and to ensure accuracy the tape should be made to pass over the two nipples, or at the same distance above and below them. The chest should first be measured after a full expiration, and then after a deep inspiration: by watching the movement of the tape, we may measure the degree of expansion which both sides of the chest undergo. This will give us useful information as to the condition of the lungs. In making these measurements, the fact already stated, viz., that the right side of the chest is naturally larger than the left by half an inch, must be borne in mind. The progressive enlargement or diminution in the size of the chest which accompanies certain forms of disease may also be ascertained by repeated measurements; but such measurements require to be made with great care, in the same position, and in the same condition of the cavity of the chest.

THE LUNGS.

559. The cavity of the chest consists of a hollow cone, of which the apex is cut off above by a horizontal plane, corresponding with the

Fig. 35.

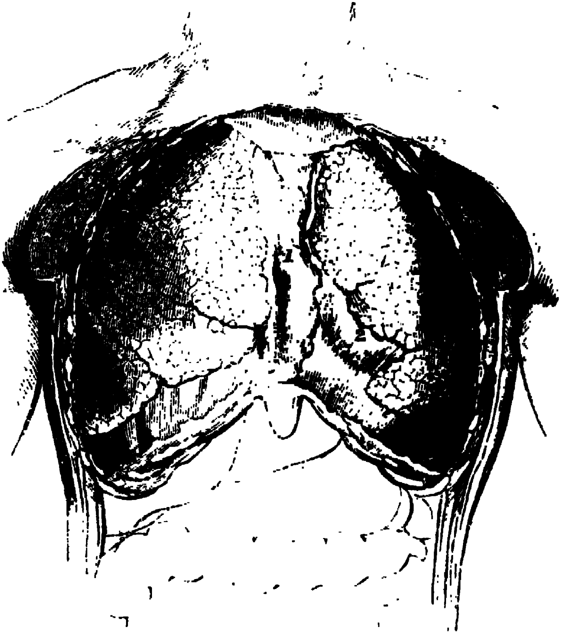


upper opening of the chest, and the base by an oblique plane, looking forwards and downwards, and constituting the lower opening. The upper opening is filled by the trachea, œsophagus, and large blood-vessels; the lower opening is closed by the diaphragm. This conical cavity is flattened before where the cartilages of the ribs are joined to the sternum, and behind where the ribs unite with the spine; but it is rounded at each side where it is formed by the ribs and their cartilages.

560. The principal parts contained within the cavity of the chest are the lungs and the heart, of which the former occupy by far the largest portion. The size of the chest corresponds closely with the size of the lungs, and is liable to various deformities, in consequence of diseases affecting those organs. But the shape of the chest is also altered in certain diseases of the heart and large vessels.

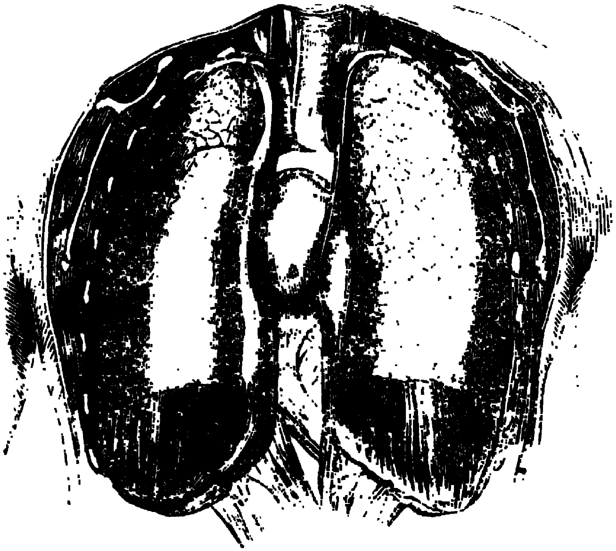
561. The lungs are in close contact with the walls of the chest in every part, with the exception of a small space (2) to the left of the sternum, where the lungs leave a portion of the middle mediastinum containing the heart uncovered, and a narrow space (1) behind the sternum corresponding to the track of the large vessels. This is shown in the annexed engraving.

Fig. 36.



562. Of the two lungs the right is the larger, but the left the longer, its apex rising somewhat higher, and its base sinking lower. The right lung reaches to about the level of the sixth rib in front, of the eighth rib at the side, and still lower behind. The left lung extends to the level of the seventh rib anteriorly, it reaches the eighth rib laterally, and descends still lower posteriorly. Both lungs applying themselves closely to the diaphragm, descend much lower behind than before, being there prolonged into thin lappets. The diaphragm separates them from the liver on the right side, from the stomach in the region of the epigastrium, and from the spleen and colon on the left side posteriorly. (Figs. 36, 37, and 38.)

Fig. 37.

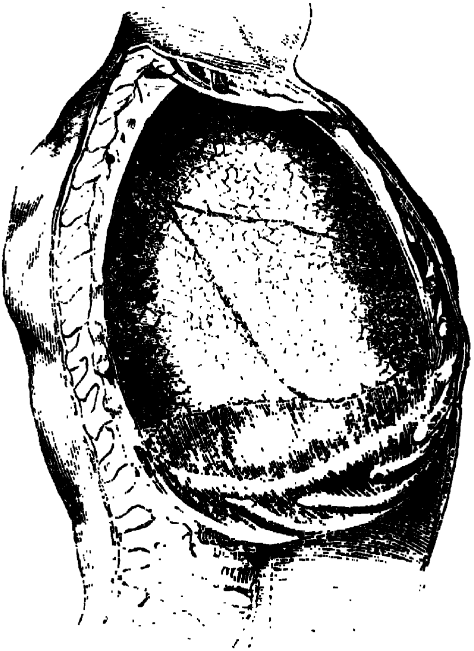


563. The chest is subjected to several kinds of examination, having special reference to the condition and functions of the lungs. Our object in these examinations is—1. To ascertain the number and character of the respirations. 2. To determine the capacity of the lungs. 3. To find out the true condition of the texture of the lungs.

564. 1. *The Number and Character of the Respirations.*—We may count the respirations in one of two ways: by observing the motions of the trunk or of some article of clothing which moves as

it moves, or by placing the hand on the chest or abdomen. The first of these two methods is best adapted to the sitting or erect

Fig. 38.



posture, the last to the recumbent posture. The most convenient plan is to place the patient in the recumbent position, to cause the hand to rest on the abdomen, grasping the wrist at the same time as if feeling the pulse. In either case, whether counting the respirations by sight or by touch, the attention of the patient should be withdrawn from the breathing, as the muscles of respiration are partially under the control of the will. The character of the respirations, whether natural, slow or quick, easy or laboured, sighing, catching, or gasping, may also be ascertained in either of these ways.

565. In this place it may be well to observe that the character of the respiratory movements differs in the two sexes and at different ages. In very young children they are performed chiefly by the abdomen; in adults of both sexes mainly by the chest. In the male the lower part of the chest, in the female the upper part of the chest, is brought mostly into play. This difference is observable even in dyspnœa as it affects the two sexes.

566. In very tranquil breathing, inspiration is performed almost entirely by the descent of the diaphragm, marked by the gradual protrusion of the abdomen, and expiration by the contraction of the abdominal parietes. In ordinary respiration, however, the ribs are raised and tilted outwards during inspiration, to recover themselves by their own elastic reaction during expiration. In violent inspiration, other muscles besides the diaphragm and intercostals are called into play, especially those by which the scapulæ are raised and fixed. In violent expiration, as in coughing and sneezing, the abdominal muscles are brought into action, by which the viscera of the abdomen are compressed and the diaphragm forced upwards into the chest. Yawning and sighing are forms of deep inspiration; coughing and sneezing, of violent expiration. Deep inspirations relieve the circulation by leaving greater space for the admission of blood into the heart, whilst violent expirations are chiefly of use by freeing the lungs or air-passages of noxious and irritating substances.

567. Attempts have been made to assist the senses in counting the breathings, and in measuring the magnitude of the respirations by the amount of expansion taking place in the parieties of the chest.

568. As the instrument which I have made use of for counting the respirations has not yet been employed at the bedside, a very brief description of it will suffice. It is an adaptation of one form of the pedometer. It resembles a large watch with a dial-plate graduated to 10,000, and furnished with two hands, one of which is set in motion by a string attached to a short chain. The instrument is fastened over the pit of the stomach by a band passing round the abdomen, and the string is made tense in the act of expiration, so as to set the long hand in motion, by fastening the free end to any fixed point at a short distance from the body. Every act of inspiration accordingly, by bringing the two fixed points nearer together, relaxes the string, while every act of expiration tightens it and sets the hand in motion, causing it to traverse one space on the dial-plate The experiments of which the results were given under the head of THE RESPIRATION, were performed by means of this instrument.

569. An instrument for measuring the magnitude of the inspirations has been invented by Dr. Richard Quain. It consists of a string passing round the chest, adjusted in the act of expiration, and when the chest is expanded by inspiration, indicating the amount of the enlargement by a hand moving upon a dial-plate.

570. *The Capacity of the Lungs.*—Two plans have been proposed for ascertaining the capacity of the lungs; the one by Dr. Lyons, the other by the late Mr. Abernethy. The latter plan has lately been much improved by Dr. Hutchinson.

571. Dr. Lyons' method consists in measuring the length of time required to empty the chest after a complete inspiration, by counting aloud. To render the expiration continuous and complete, the patient

is required to count from one upwards, as far as he can, slowly and audibly; and the number of seconds during which he is able to count is noted by a watch. The time occupied is a sort of measure of the capacity of the lungs. Dr. Lyons fixes the limit of time for perfectly healthy persons at thirty-five seconds: this is too low; for in more than one trial I have myself continued to count for forty seconds. In confirmed phthisis, Dr. Lyons says that the period of expiration never exceeds eight, and is frequently less than six seconds; whilst in pleurisy and pneumonia it may range from four to nine. This test is subject to greater fallacy than Mr. Abernethy's, but may admit of useful application.

572. Mr. Abernethy's method consists in making the patient take as deep an inspiration as possible, and then causing him to expire through a bent tube, communicating with an inverted jar containing water. The quantity of water displaced is a measure of the capacity of the lungs. A person in good health, with sound lungs, can displace six or eight pints. If the quantity displaced is much less than this, we may infer that the lungs are diseased, or compressed from without. "Muscular debility or spasm," says Mr. Abernethy, "may occasionally make the result doubtful, yet in general I believe it will afford useful information."

573. This method of estimating the capacity of the chest was also employed to a limited extent by Mr. Thackrah of Leeds, who examined nineteen officers and soldiers of the 14th Light Dragoons, with the following results:—

	Cubic inches.
Nine officers	240
Six privates	247
Four musicians, using wind instruments .	220
A tall young cornet	295

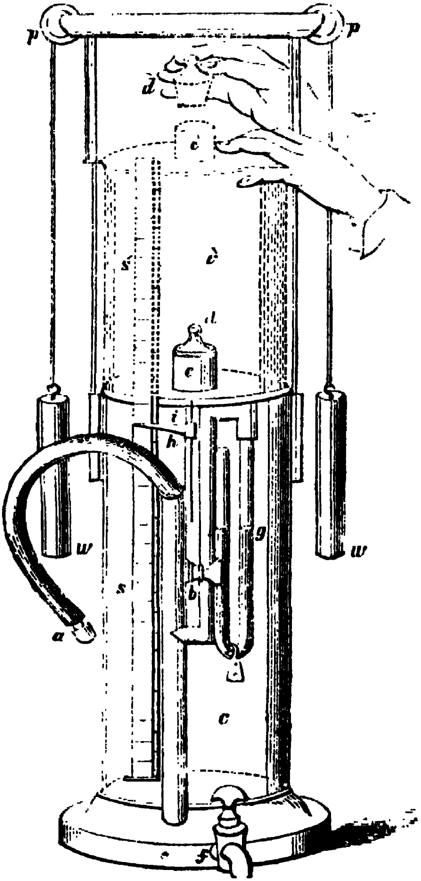
Mr. Thackrah suggested that this test might be usefully applied in examining recruits for the army. In tailors, he found a mean of 221, and in shoemakers of 182 cubic inches.

574. Dr. Hutchinson has improved upon this rude method by substituting for the jar containing water a gasometer properly poised, and admitting of accurate adjustment. As Dr. Hutchinson's instrument is now in use in several Insurance Offices, and is believed to afford useful indications in some cases of early chest affection, a woodcut, with a short description is introduced in this place.

575. The instrument consists of a cylindrical vessel, *c*, capable of holding several pints of water, which is filled by a spout at the top, and may be emptied by a stop-cock, *f*, at the bottom. Into this vessel a cylinder, *c′*, of smaller size counterpoised with the weights, *w w*, is inverted. The cover of this vessel has an opening, *c′* and *c*, in the centre, which may be closed at will by the plug, *d′* and *d*. An elastic tube, *a*, with a glass mouth-piece, and furnished with a stop-cock, *b*, communicates with the lower vessel, c. The bent

glass tube, *g*, also communicates with the lower vessel, as does the glazed space, *i*. A graduated scale, *s'* and *s*, attached to, and moving with, the upper vessel, *c'*, and an index, *h*, completes the instrument. If we suppose the gasometer, *c'*, to be filled with air so as to occupy the position indicated by the dotted lines, the instrument is prepared for use by taking out the plug, *d'*, and lowering the gasometer till the coloured spirit in the two legs of the syphon, *g*, stands at the same level. The index, *h*, is then placed at the level of the water in the glazed space, *i*, which communicating with the reservoir, *c*, shows the height of the water within, and at zero of the scale. The plug, *d*, is now replaced, the stop-cock, *b*, being supposed to remain closed. The subject of the experiment then fills his chest completely, and applying his mouth to the mouth-piece, and at the same time opening the stop-cock, *b*, discharges the air from his lungs. The gasometer rises, the stop-cock, *b*, is again turned so as to close the passage for the air, the coloured liquid in the syphon, *g*, is again brought to a level in the two legs, and the height of the scale above the index marks the number of cubic inches which have been expired, and measures, if the experiment has been properly performed, the capacity of the lungs, or, to speak more correctly 'the quantity of air which an individual can force out of his chest by the greatest voluntary expiration, after the greatest voluntary inspiration.'

Fig. 39.



576. By means of very numerous observations made with this instrument, Dr. Hutchinson was able to establish certain averages for the healthy chest, which he then used as standards of comparison for the chests of consumptive patients. He found that the limits of the capacity of the chest in healthy persons, were 80 cubic inches in a dwarf measuring 3 feet 9 inches, and 464 cubic inches in a giant measuring 6 feet 11½ inches. He also ascertained that the capacity of the chest was 40 or 50 cubic inches below the mean in very fat persons; that it was reduced from 4 to 6 inches by a moderate meal, and from 9 to 14 cubic inches after a full meal; that it is greatest in the erect posture; that it diminishes after 55 years of age; that it bears a very remarkable relation to the stature; and that it is greatly diminished in cases of pulmonary consumption.

577. The following table presents in the first column the ascertained or calculated capacity of the lungs in healthy persons between the ages of 15 and 55, and of different statures, from 5 to 6 feet; in the second column the capacity of the lungs of persons of the same stature, suffering from the early stage of pulmonary consumption; and in the third column, the capacity of the lungs in persons of the same stature, in the advanced stage of consumption. (The table is taken from Dr. Hutchinson's work on the Spirometer, the figures 5 feet 1 inch, 5 feet 2 inches, &c. being substituted for 5 feet to 5 feet 1 inch, 5 feet 1 inch to 5 feet 2 inches, &c.)

Stature.		*Capacity. Healthy Males.*	*Early Stage of Consumption.*	*Advanced Stage of Consumption.*
Feet.	Inches.	Cubic Inches.	Cubic Inches.	Cubic Inches.
5	1	174	117	82
5	2	182	122	86
5	3	190	127	89
5	4	198	133	93
5	5	206	138	97
5	6	214	143	100
5	7	222	149	104
5	8	230	154	108
5	9	238	159	112
5	10	246	165	116
5	11	254	170	119
6	0	262	176	123

578. The disparity which this table proves to exist between the capacity of the lungs in healthy persons, and in persons of the same stature labouring under incipient and advanced consumption, is so considerable as in itself to prove the utility of this mode of testing the soundness of the lungs. But it must be borne in mind that emphysema and bronchitis, as well as diseases of the heart encroaching on the lungs, would give rise to the same results. In making a practical application of the figures contained in the first column, it would probably be unsafe

to set down to the account of disease of the lungs a moderate diminution of capacity; though Dr. Hutchinson himself is of opinion that if a man between 5 feet 7 inches and 5 feet 8 inches, who ought to expel about 220 cubic inches of air, can expel no more than 185 cubic inches, or if a 6-foot man who ought to expel about 260 cubic inches, is not able to expel more than 200 or 220 cubic inches, disease may be suspected to exist. When we bear in mind the modifications in the capacity of the lungs due to the causes specified in § 576, and especially that, according to Dr. Hutchinson's statement, 'very fat men of any stature may blow 40 or 50 cubic inches less than the mean, and yet not be diseased in the chest,' it is but reasonable to suppose that other causes compatible with health may lessen the capacity of the chest. It will be seen, however, that the figures in the second column are so much below those belonging to the healthy chest as to furnish in themselves a very strong presumption of the existence of disease.

579. It is scarcely necessary to observe, that in making use of Dr. Hutchinson's instrument, the patient should be in the erect posture, and that he should be narrowly watched to see that he performs the operation of expanding his chest and expelling the air carefully and properly. Allowance must also be made for advance in age above 55.
Dr. Hutchinson has also made a great number of observations, by means of an instrument of his own invention, upon the inspiratory and expiratory power, or the force exercised by the muscles of inspiration and expiration in inspiring or expiring air through the nostrils. As these experiments have obviously no very important practical bearing this short notice of them will suffice.

The Condition of the Texture of the Lungs.—The means which we employ for ascertaining the condition of the texture of the lungs are familiarly known as percussion and auscultation.

580. *Examination of the Lungs by Percussion and Auscultation.*—The ear is employed in two ways in examining the lungs,—in listening to the sound occasioned by percussion of the parietes of the cavity, and in listening to the sounds produced in the chest itself by the passage of the air through the lungs, and the movements which take place between the lungs and the cavity of the chest. Both these modes of examination are included in the meaning of the term auscultation; but it is usual to designate the first *percussion*, and the second *auscultation*.

581. *Percussion.*—If the chest, instead of containing a variety of solid parts, were filled with air, it would yield, when struck, a sound like that of an empty barrel or drum; if, on the contrary, it were filled with solid animal substance, it would sound as dull as the arm or thigh. But containing, as it does, a spongy organ, the lung, including in its tissue a large quantity of air, it yields, when struck, a hollow sound, but one less hollow than that which it would give if empty. The more air it contains, the more hollow it sounds; hence

the sound is clearer during inspiration than during expiration. If, again, the texture of the lung be so altered as to admit a larger quantity of air, the chest yields a clearer sound: this takes place in emphysema. On the other hand, if the lung from any cause admit less air than usual, the sound becomes more dull: this happens in congestion of the lungs, in inflammation, in tubercular deposition; as also when fluids, collecting in the sac of the pleura, compress the structure of the lung, as in hydrothorax and empyema. But if, instead of fluid, air exist in the cavity of the pleura, the sound, instead of being more dull, would be more hollow than if the healthy lung were in contact with the walls of the chest.

582. The chest, then, yields a hollow sound when it contains air, a dull sound when air is excluded; the degree of hollowness or dulness depending upon the quantity of air. But there is another cause which influences the nature of the sound, viz., the thickness of the parietes of the chest itself. If two chests contain exactly the same quantity of air, that will give the clearest sound which has the thinnest parietes. If the walls of the chest are padded with muscle or fat, the sound becomes more dull. In the healthy chest, then, the clearness of the sound will vary directly as the quantity of lung beneath the part struck, and inversely as the thickness of the parietes in that part.

583. Again, wherever the substance of the lung is thin, the sound on percussion is modified by the viscus lying immediately behind it: thus, below the fourth rib, the layer of lung lying in front of the liver is thin, and the sound is consequently intermediate between that of the chest above and below it, more dull than the upper part, less so than the lower. In the same manner the thin layers of lung which overlay the heart, so as to leave only a small portion of it uncovered, occasion the same phenomenon of a clear sound on gentle percussion, and a dull sound on strong percussion. The limits of this clear sound heard on gentle percussion are somewhat extended during a deep inspiration, which stretches and expands the lungs, and diminished by forcible expiration, which contracts them. In this position, and in all cases where a thin layer of healthy lung lies in front of a solid organ or consolidated portion of lung, gentle percussion elicits the clear sound of the healthy lung, strong percussion that of the solid substance behind it.

584. The parts of the chest which yield the clearest sound are those which are least covered with muscle, viz., the space immediately beneath the clavicle, the axilla, and the posterior parts of the chest, with the exception of the scapulæ.

585. The mass of the liver in the right hypochondrium explains the dull sound caused by percussion below the level of the sixth rib; the stomach, which usually contains flatus, accounts for the clearer sound heard on the left side.

586. In examining the chest, the patient should be placed in the erect or sitting posture, and, if possible, in an open room. All cur-

tains, bed-clothes, &c., dull the sound. The chest should be bare when practicable, but in females it may be covered by a single layer of clothing. Each part of the chest submitted to examination should be rendered as tense as possible; the anterior part of the chest, by stretching the neck and throwing back the shoulders; the supra-clavicular space by turning the neck to the opposite side; the axillæ, by raising the arms above the head; and the posterior part of the chest by causing the patient to fold his arms and stoop down. Opposite and corresponding points of the chest should be accurately compared. For this purpose, the position of both sides must be the same. If we are examining the anterior part of the chest, the hands must fall loosely at the sides; if the lateral regions, they must be raised equally above the head; if the posterior, they must be equally folded.

587. There are different ways of eliciting the sounds of the chest by percussion. We may strike with the points of the fingers, or with the flat of the hand; or we may interpose the fingers of the opposite hand, or a thick piece of Indian rubber, or a plate of wood or ivory. Such things are called "pleximeters," and percussion, by means of them, is named "mediate percussion."

588. Direct percussion with the points of the fingers ought never to be employed, except for the purpose of throwing the muscles of the chest into action, with a view of ascertaining either the irritability of the muscles or the seat of pain. In many cases, especially in advanced phthisis pulmonalis, the skin and muscles are acutely sensitive, and the slightest touch occasions pain. This is a sufficient objection to direct percussion with the finger. Percussion with the open hand is little used, except as a means of contrasting the two sides of the chest over their whole extent at once.

589. Mediate percussion ought always to be preferred, and the best pleximeter is formed by one or two fingers of the left hand applied closely to the surface. The finger should always be applied with a tolerably firm pressure, especially in stout, flabby, dropsical, or emphysematous subjects. By such pressure the skin and flesh are condensed, and made better conductors of sound. The finger thus applied should be sharply struck by the three middle fingers of the right hand, taking care to strike perpendicularly to the surface, and not obliquely. In comparing the two sides of the chest, care should be taken to strike the same point, with the same force, and in the same condition of the chest, whether filled with air in inspiration, or partly emptied by expiration. The comparison can be most accurately made when the breath is held. When it is desired to ascertain the condition of a small spot, one finger only of the right hand should be used.

590. The chief indications given by percussion in disease have been already hinted at. When practised on a part of the chest where a mass of lung is situate, it will yield either a clear or a dull sound. The indications afforded by such sounds are shown in the following table:—

	In the Lungs.	*External to the Lungs.*
Clear Sound on Percussion.	Healthy condition. Emphysema. Tubercular excavation.	Pneumothorax.
Dull Sound on Percussion.	Congestion and hepatization. Pulmonary apoplexy. Œdema. Tubercular deposit. Other morbid degenerations.	Pleuritic effusion. Hydrothorax. Hæmathorax. Tumours in pleura or mediastinum. Diseases of heart or arteries, with enlargement.

591. The position in which the clear or dull sound occurs will often enable us to judge of the cause by which it is produced. Thus emphysema, though it may be confined to one side, and to a small portion of lung, commonly occurs on both sides of the chest at once, and over a large portion of the lungs; pneumothorax, on the contrary, is usually confined to one side, and tubercular excavations occupy, for the most part, the upper lobes of the lungs.

592. A dull sound may arise from a greater variety of causes, which, however, admit of the same distinction. Thus congestion, and the various degrees of hepatization, the consequence of pneumonia, occupy chiefly the lower lobes, on one or both sides; œdema commonly exists in both lungs at the same time; tubercular deposit is found chiefly in the upper lobes, whilst other morbid degenerations occupy all parts of the lungs indifferently. Of the causes situate external to the lungs, pleuritic effusion and effusion of blood are commonly confined to one side; hydrothorax extends to both; the tumours in the pleura and mediastina may occupy any position; diseases of the heart itself will affect the parts in the neighbourhood of that organ; and aneurismal tumours chiefly the upper and anterior part of the chest.

593. *Auscultation.*—The passage of the air through the various structures of the lungs in inspiration and expiration, is accompanied by certain sounds, which are easily recognized on applying the ear or the stethoscope to the chest. They vary in different parts of the chest. When the ear is applied to the neck or upper part of the sternum during inspiration, a hollow, blowing sound is heard—this is tracheal respiration; on each side of the upper part of the sternum, between the scapulæ, and sometimes in the axillæ, a whiffing tubular sound is heard—this is bronchial respiration; on most other parts of the chest a sound is heard which has been compared to that of a sleeper breathing gently through the nostrils, or to the sighing of a gentle breeze—this is called vesicular, from its presumed seat, the air-cells. The student should familiarize himself with these sounds, especially the latter, by applying the ear to the healthy chest; and as this sound is most distinct in children, he should examine it in them. The same sound is heard in expiration; but it is less distinct, and of shorter continuance.

594. The intensity of the sound varies in different healthy persons, and in the same person at different times. It is more intense, as has been stated, in young children; and also in females, a fact which may perhaps be accounted for by the increased respiratory effort necessitated by the confinement of the chest by stays. It is also augmented by deep inspiration; hence, when the sound is naturally dull, it may be produced by causing the patient to breathe quick, or to draw a deep breath, or to cough, whereby the lungs are emptied, and a full inspiration secured. The respiratory murmur is also rendered more intense in one part of the chest by any impediment to the respiration in the rest of the lung: in this case it is called puerile, from its resemblance to the respiratory murmur of the child. Such partial increase of intensity is a pretty certain sign of consolidation of the remaining portion of the lungs.

595. The respiratory murmur is sometimes scarcely perceptible, and the absence of it is not always a sign of disease. As a general rule, it may be stated, that where the absence of this sound does not coexist with any other morbid sounds, or with dulness on percussion, it should not be regarded as an indication of disease. The respiratory murmur may be absent in limited portions of the chest, in consequence of the bronchial tubes being obstructed by tenacious mucus; but here percussion will give a clear sound; or it may be absent, because the air-cells are filled with fluid from within, or compressed from without. In this case, the chest will sound dull on percussion, except where the pressure is occasioned by air in the pleura (pneumothorax).

596. The *bronchial* respiration in the healthy state is only heard in parts of the chest corresponding with the track of the large bronchial tubes; but if the lung be condensed, from whatever cause, it not only loses its proper respiratory murmur, but, becoming a better conductor of sound, conveys to the ear the sound produced in the bronchial tubes. Hence, bronchial respiration heard with unusual distinctness near the site of the bronchial tubes, or heard on one side, when not audible on the other, or with widely-differing intensity, or in parts where it is not heard in health, is an indication of consolidation of the lung by inward disease or outward pressure.

597. The bronchial respiration, as thus heard, assumes different characters; sometimes resembling puerile respiration in an intense degree; at other times, the noise made by drawing the breath through the closed hand; at others, that occasioned by blowing into a quill; at others, the short puff used in blowing out a candle.

598. To the same class of sounds belongs the so-called *cavernous* respiration, which, in its more marked form, produces a perfect illusion of air drawn through the stethoscope during inspiration, and puffed into the ear during expiration. This arises either from dilated bronchi, or, more generally, from an excavation in the substance of the lung.

599. The *amphoric* respiration closely resembles the sound produced by blowing into a bottle, and is caused by the passage of air into a cavity lined with a dense membrane.

600. Besides the respiratory sounds produced in the tubes and air-cells of the lungs, and occurring when those parts are moistened by their natural secretions, and in their natural quantity, there are other sounds due to the increased resistance offered to the passage of air through those parts, by constriction of the parts themselves, or by fluids of various degrees of consistence. These sounds are called *rattles* in English, *râles* in French, and *rhonchi* in Latin. The term *rhonchus* is in most common use in this country. These sounds are further distinguished as *dry* and *moist*—the dry being due to the swelling of the mucous membrane, constriction of the tubes, obstruction from viscid phlegm, &c.; the moist to fluids of less consistence accumulated in the several parts of the lungs.

601. Rhonchi occur in three situations,—in the air-cells (*vesicular*), in the bronchial tubes (*bronchial*), and in cavities formed in the structure of the lung (*cavernous*).

602. *Vesicular rhonchi* are of two kinds, (*a*)—*dry crepitous* or *dry vesicular rhonchus.* (Râle crepitant sec à grosse bulles, or craquement of Laennec.) This sound resembles that produced by blowing into a dried bladder. It occurs only in emphysema of the lungs, and is most distinctly heard in interlobular emphysema. It is only heard during inspiration. (*b*) *Moist crepitant and sub-crepitant rhonchus:* (Râle crepitant of Laennec.) This resembles the crepitation of salt thrown on hot iron, or the sound produced by rubbing a lock of hair between the finger and thumb, or the crepitation of a healthy lung distended with air, when pressed by the hand. It exists in all cases where the smallest bronchi and air-cells are partially filled with viscid fluid, provided that they still admit the passage of air. Thus it is present in œdema and apoplexy of the lungs, occasionally in pulmonary catarrh and bronchitis, and in the first stage of phthisis. It is also present in the first stage of pneumonia, constituting its most constant and characteristic sign; it disappears when hepatization comes on, and reappears when the inflammation is subsiding, and the lung begins to resume its healthy condition. In the first and last of these stages the moist crepitant rhonchus alters and obscures the respiratory sound, but does not completely mask it; in the stage of hepatization, both sounds are absent.

603. *Bronchial rhonchi.*—These, too, are *dry* or *moist.* The *dry* bronchial rhonchi are the *sibilant* and *sonorous.* The *sibilant* resembles a prolonged whistle, or the momentary and interrupted chirping of birds, or the sound emitted by the sudden separation of two portions of smooth oiled stone. The *sonorous* rhonchus resembles the snoring of a person asleep, or the bass note of a violoncello or bassoon, or the cooing of a pigeon. All these varieties of sound arise from contraction of a portion of a bronchial tube, by thickening of the mucous mem-

brane, or by pressure of a limited portion of consolidated lung, &c.; or by a portion of tenacious mucus, the sibilant rhonchus existing probably in the smaller, and the sonorous in the larger bronchial tubes. Allied to these sounds, a sort of *click* is sometimes heard, either during inspiration or expiration, arising probably from the sudden displacement of a portion of viscid mucus adhering to the interior of a bronchial tube. The *moist* bronchial rhonchus is called the *mucous rhonchus* (râle muqueux of Laennec). It is due to the passage of air through tubes containing a fluid, and closely resembles the sound produced by blowing through a pipe into soap and water. It is present in pulmonary catarrh, bronchitis, and hæmoptysis, and in all diseases accompanied with much expectoration, as in the third stage of pneumonia, and in phthisis. *Tracheal* rhonchus is a mere modification of this sound, existing in the trachea when filled with fluid. It has been compared by Laennec to the rolling of a drum at a distance, or the noise of a carriage in a paved street.

604. *Cavernous rhonchi.*—These, also, are *dry* and *moist.* The *dry* cavernous rhonchus is extremely rare, as the cavities in which it exists are rarely found empty. The *moist* cavernous rhonchus has its seat in a cavity of the lungs, which, in ninety-nine cases out of a hundred, is of a tuberculous origin. It consists of the bubbling or gurgling of a fluid in a *circumscribed* cavity, and forms, when well marked, the surest sign of a tuberculous excavation.

605. In addition to the sounds just described, there are others which are produced by the *voice.* If we put the ear or the stethoscope to a healthy chest, we commonly perceive a diffused resonance: this is most distinctly heard in the situation of the bronchial tubes, as, for instance, between the scapulæ. If we lay the hand on the chest whilst a person is speaking, especially if the voice be a bass, we perceive a vibration. This has been called *fremitus.* If, instead of applying the stethoscope to the chest, we place it over the larynx or trachea, the voice does not merely vibrate, but seems to pass through the tube to the ear, being much more clearly perceived by the ear applied to the stethoscope than by the other. This sound is called *laryngophony.* The same sound is heard when the lungs between the bronchial tubes and the parietes of the chest are condensed, and especially if the bronchi are at the same time enlarged—this is *bronchophony.* If in the cavity of the pleura, external to a condensed lung, a thin layer of fluid is deposited, as happens in recent cases of pleuritis, a sound is heard like the bleating of a goat, or the squeaking of Punch—this is *ægophony.* Again, in cases of pulmonary excavation, the sound of the voice passes through the tube to the ear, as in laryngophony, and receives the name of *pectoriloquy.* Lastly, in cases where a large cavity, filled with air and communicating with the bronchi, exists in the chest, a sound is produced during respiration, by speaking, or in coughing, which resembles either the falling of a pin into a cup or glass, or that caused by blowing quickly and forcibly into a bottle with a narrow neck. The first is called *metallic tinkling,* the second

amphoric resonance or *buzzing*. These sounds are heard most distinctly in pneumothorax; but they also occur in large abscesses of the lungs.

606. There is one sound, which, though due to an external cause, may be confounded by the beginner with sounds produced within the chest—the *muscular sound* (bruit musculaire). It is always heard during muscular contraction, and is peculiarly distinct during the tremulous action of the muscles from cold, and when the muscles are put upon the stretch. When the neck and shoulders are forcibly thrown back in examining the anterior part of the chest, when the hand is forcibly raised above the head, or the arms strongly folded across the chest, the patient stooping at the same time, this sound is very distinctly heard. It is an extremely rapid vibrating sound, bearing a close resemblance, when strongly marked, to the distant rumbling of carriages over a paved street. The pupil should make himself familiar with this sound, by placing his ear on the pillow, and contracting the masseter muscles with different degrees of force and quickness, taking care, at the same time, to avoid grating the teeth. When he closes the jaw gently, he will hear the rapid vibration just mentioned; a stronger contraction will render the vibration still more rapid; a strong and abrupt contraction closely imitates the first sound of the heart; a still stronger and quicker one produces a sound which might be confounded with the "bruit de soufflet," and [illegible]

effort, perceives a sound not easily distinguished from the first sound of the heart. The continued nature of the "bruit musculaire" distinguishes it at once from all the respiratory sounds.

607. It only remains to mention a sound produced external to the lungs, and in the sac of the pleura. It is a *friction* or *to-and-fro* sound, occurring both in inspiration and expiration when the pleuræ are dry and rough with deposits.

608. The following table, which presents at one view some of the chief points just stated, may be referred to with advantage, especially by the young auscultator. It is taken, with some modifications, from Dr. Williams's article on the Diagnosis of the Diseases of the Chest, in the Library of Practical Medicine, vol. iii. p. 18.

SOUNDS PRODUCED BY THE PASSAGE OF THE AIR IN RESPIRATION.

NATURAL.

Tracheal; heard in the neck and at the top of the sternum.
Bronchial; near the upper part of the sternum, and between the scapulæ.
Vesicular; on most other parts of the chest.

MORBID.

Bronchial Respiration; from condensed lung.
Cavernous, / *Amphoric;* } in morbid cavities, communicating with the bronchi.

RHONCHI. *Moist.* *Mucous;* liquid in bronchi.
Crepitant; viscid liquid in small tubes and air-cells.
Dry. *Sibilant,* / *Sonorous,* / *Dry mucous.* } Produced by contraction of bronchi, by swelling of mucous membrane, by pressure, and by tenacious mucus.
Dry crepitant; in emphysema, especially interlobular emphysema.
Cavernous; liquid in a morbid cavity.

SOUNDS OF THE VOICE TRANSMITTED THROUGH THE CHEST.

NATURAL.

Laryngophony; over larynx.
Tracheophony; neck and upper part of sternum.
Bronchophony; near top of sternum, between the scapulæ, &c.
(*Pectoral frémitus;* perceptible to the touch in many parts of the chest).

MORBID.

Bronchophony; condensed lung.
Ægophony; the same, vibrating through a thin layer of fluid.
Pectoriloquy; in a cavity of the lungs.
Tinkling, &c.; a changed echo of voice or cough in a large cavity.

SOUNDS PRODUCED BY THE MOTIONS OF THE LUNGS.

Friction-sounds, when the pleuræ are dry or rough from deposit.

SOUNDS PRODUCED BY THE CONTRACTION OF THE MUSCLES.

Vibratory sound of varying intensity.

THE HEART.

609. The position of the heart and large vessels, and their relation to the walls of the chest, and to the lungs, will be best understood by referring to the woodcuts at pp. 141 and 142. It will be seen that the lungs, which fill so large a part of the chest, leave an irregular space (1 and 2, Fig. 36) in the anterior part of its cavity unoccupied. That part of this space (1) which lies behind the upper half of the sternum, is of a nearly uniform width of two inches, the anterior edges of the two lungs being at this part of the chest nearly parallel. The lower portion of this space (2), on the other hand, being formed by the wide separation of the left lung from the right (which latter continues its nearly straight

course along the right margin of the sternum), is of an irregular triangular shape. The upper portion of this space corresponds to the large vessels, the lower portion to the heart. This space, however, by no means represents the size and shape of the heart and large vessels, but merely of such portions of them as are not concealed from view by the thin lappets of the lungs stretched over them; nor can the heart and large vessels be fully seen until the pericardium and the cellular membrane connected with it have been dissected away, and these portions of the lungs have been turned aside to the right and to the left.

610. The pericardium, which invests the heart with a close and a reflected covering, attaches itself firmly by the latter to the large vessels above, and to the diaphragm below; so that the heart itself beats within this serous covering, subject to be pulled down with it, when it is put on the stretch by the diaphragm descending in the act of inspiration, and to be moved upwards when it is released by the diaphragm being thrust up by the viscera of the abdomen during expiration.

611. As the large vessels, which are firmly bound to each other, and to surrounding parts, arise from the base of the heart, and as the short ascending cava binds the base of the heart to the tendinous portion of the diaphragm, that portion of the organ is not subject, in healthy persons, to any material alteration of position.

612. The large vessels, therefore, form a sort of fixed point on which the heart moves. From this fixed point it is tilted and twisted forward during the contraction of the ventricles; towards this same point it is raised with the diaphragm during expiration; and from this point it is pulled downwards into a more vertical position during inspiration. These changes of position are exaggerated by the ribs moving in opposite directions to the diaphragm.

613. The change in the position of the heart, due to these movements of inspiration and expiration, is so considerable that, during a deep inspiration, the apex of the heart, instead of beating in the fifth intercostal space, may be felt in the sixth, but indistinctly, in consequence of the elevation of the ribs drawing the lung in front of it. By a forced expiration, on the other hand, the ribs are drawn down and brought more completely into contact with the heart, so that the beat of the heart may be felt in the fourth intercostal space, and even as high as the third rib.

614. The same act of inspiration which depresses the diaphragm, and tilts the ribs outwards, expands the lungs, so that their anterior edges slide over the pericardium; and the same act of expiration which forces the diaphragm upwards, and pulls the ribs downwards, so as to contract the chest, causes the lungs to collapse, and their anterior edges to slide back again and leave a larger portion of the pericardium exposed. A distended stomach, or an enlargement of the abdomen, from whatever cause arising, will have the same effect on the position of the heart, as an act of expiration.

615. In consequence of the freedom of motion which the body of the heart enjoys, it is also liable to undergo changes of position as the [illegible] of the body is changed. It falls back and quits the anterior wall [illegible] chest, to some extent, when we lie down, and it moves som[illegible] to the right or to the left as we lie on the right or on the left side. These facts have a close and obvious bearing upon the examination of the heart by percussion and auscultation.

616. The heart, then, occupies an oblique position within the chest, with its base, fixed by the attachments of the large vessels, directed (the body being erect) upwards, backwards, and to the right side; the apex downwards, forwards, and to the left; the base separated from the fifth, sixth, and seventh dorsal vertebræ by the descending aorta and œsophagus; the apex, when the ventricles are contracted, and the respiration tranquil, corresponding to the space between the fifth and sixth ribs—a point about two inches below, and one inch to the inside of the left nipple, or two inches and a half from the left border of the base of the ensiform cartilage. One half of the heart, consisting of a small portion of the left auricle and ventricle, and the left vertical half of the right ventricle lies to the left of the sternum, behind the cartilages of the fourth and fifth, and the sternal articulations of the third, sixth, and seventh ribs, and the fourth, fifth, and sixth intercostal spaces: the other half of the organ, consisting of nearly all the remainder of the right ventricle, lies behind the lower half of the sternum, a small portion only of the ventricle and the right auricle being behind the sternal articulations of the third, fourth, and fifth ribs, and the fourth and fifth intercostal spaces of the right side. The flat under and posterior surface of the left ventricle lies upon the diaphragm, which separates it from the left lobe of the liver; the rounded upper and anterior right ventricle is turned upwards and forwards, separated from the sternum and thin anterior edges of the lungs by the pericardium and loose cellular membrane connected with it.

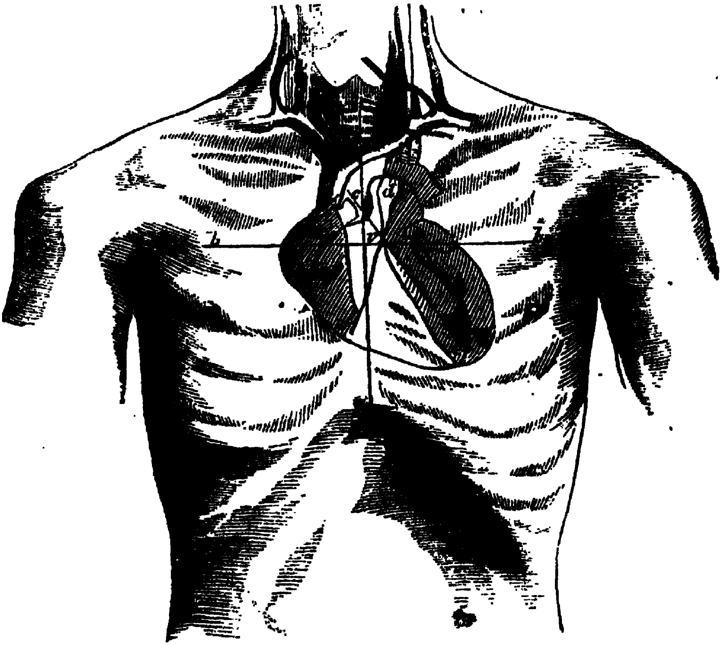
617. The orifices and valves of the heart, which are the seat of the principal abnormal sounds heard on applying the ear or the stethoscope to the region of the heart, are very close to each other, the orifice of the aorta and its valves lying nearly directly behind the orifice of the pulmonary artery and its valves, while the right and left auriculo-ventricular orifices, with the tricuspid and mitral valves, are only a third of an inch apart, and lie just below the orifices and valves of those arteries.

618. The position of these valves in the healthy subject, relatively to the bones and external parietes of the chest, has been determined by transfixing them with needles passed through the walls of the chest. It has been ascertained in this manner that, in the recumbent position of the body, the bulging portion of the pulmonary artery corresponds to the interspace between the second and third ribs of the left side, close to the sternum. Consequently a line, *b b*, Fig. 40, drawn across the

sternum to the inferior margins of the third ribs, passes over the valves of the pulmonary artery, a little to the left of the mesial line (at *v*), and about half-an-inch above the valves of the aorta, which lie (in the erect position of the body) behind the pulmonic valves. The auriculo-ventricular orifices will, in like manner, be found to correspond to a line drawn across the sternum at a somewhat lower level in the interspace of the third and fourth ribs, the valves themselves being situate somewhat to the right [illegible] left of the semilunar valves of the aorta and pulmonary artery respectively, and the right auriculo-ventricular valve being at a lower level by about a third of an inch than the left.

619. As a knowledge of the exact relation of the heart itself, and of its several constituent parts, to the bones and to the parietes of the chest, is of the first importance, with a view to a sound diagnosis of diseases of the heart, the principal points already stated will be briefly recapitulated, reference being made to the annexed engraving.

Fig. 40.



620. 1. ***Parts of the Heart and Large Vessels uncovered by the Lungs, and separated from the walls of the Chest only by the Pericardium and loose Cellular Tissue.*****—The root of the pulmonary artery and the**

ascending aorta, together with the whole anterior surface of the right ventricle, the most anterior portion of the appendix of the right auricle, with the apex and anterior margin of the left ventricle. See 1 and 2, Fig. 36, and the unshaded portion of the heart in Fig. 40, p. 159.

2. *Situation of the Pulmonary Artery.*—Close to the sternum, in the interspace of the second and third ribs of the left side.

3. *Situation of the Aorta.*—The ascending aorta lies behind the mesian line of the sternum. The arch of the aorta crosses the middle of the upper bone of the sternum, the crown of the arch being on a level with the first intercostal space. The descending aorta passes to the left side of the third dorsal vertebra.

4. *Situation of the semilunar valves of the Aorta and Pulmonary Artery.*—Immediately to the left of the intersection with the mesial line of a line, *b b*, drawn across the sternum to the inferior margins of the third ribs. The orifice of the aorta lies immediately behind that of the pulmonary artery. These valves correspond to the body of the fifth dorsal vertebra.

5. *Situation of the Auriculo-Ventricular Valves.*—To the right and left of the valves of the aorta and pulmonary artery respectively, the tricuspid being somewhat lower than the mitral, and the two valves being about a third of an inch apart.

6. *Situation of the apex of the Heart.*—The beat of the heart, when the body is erect, and the respiration tranquil, is felt between the fifth and sixth ribs of the left side, an inch and a half below, and an inch to the inside of the left nipple.

621. In examining the heart, three points demand attention,—its *position and size*, its *motions*, and its *sounds*.

622. *Position and size of the Heart.*—These are determined chiefly by percussion, and in certain cases, though with less accuracy, by the touch. In healthy and well-formed persons, a dull sound is elicited by percussion over an area of about two inches in diameter, extending from the point where the beat of the heart is felt to the left side of the lower half of the sternum. This space, which corresponds to the part of the heart uncovered by the lungs, yields a dull sound, both on strong and slight percussion. Beyond this space the sound, on percussion, is gradually softened off, in proportion as the thickness of the overlapping lung increases; but on strong and sharp percussion, the dull sound of the heart is heard through the intervening portion of lung. When the heart is enlarged, or when the pericardium is filled with fluid, the region of dulness is increased; the same effect is also produced by the consolidation of the surrounding portions of lung, or by tumours intervening between the pericardium and the walls of the chest, or by partial pleuritic effusions confined by false membranes, or even by enlargement of the left lobe of the liver. It is only in the ascertained absence of such diseased conditions that dulness on percussion may be taken as the measure of the heart's size.

623. On the other hand, the absence of this dulness on percus-

sion does not afford certain evidence of the non-enlargement of the heart, as surrounding parts may give an unusually clear sound on percussion, and thus mask the heart-affection. Emphysema of the lung, pneumothorax, or even an unusual distension of the stomach with gas, may give rise to such a clear sound on percussion. The dulness also ceases, even in healthy persons, on assuming the recumbent posture, or on taking a deep inspiration. The persistence of a dull sound under these circumstances affords evidence either of adhesions of the heart or lungs, or of such a degree of enlargement of the heart or distension of the pericardium as prevents the heart from receding.

624. *Motions of the heart.*—The auricles and ventricles contract alternately, the systole of the one being synchronous with the diastole of the other. The auricles first contract, then the ventricles. The contraction of the ventricles is followed by their diastole, and this by a short pause. During the diastole of the ventricles, and the short pause which succeeds, the blood flows from the auricles into the ventricles, and the contraction of the auricular appendices which immediately succeeds the pause excites the ventricles to new contraction.

625. The order, therefore, of the heart's movements is as follows—systole of auricles, systole of ventricles, diastole of ventricles, pause. This order of succession is called the *rhythm* of the heart's motions. Of the *whole* time consumed by these several movements, the systole of the auricles occupies less than a fourth, the systole of the ventricles a half, the diastole of the ventricles more than a fourth, and the pause a fourth.

626. The *impulse* of the heart is synchronous with the contraction of the ventricles and the pulse in the large arteries. It was formerly attributed to the tilting of the apex of the heart against the ribs, but it is now understood to depend on the sudden change of shape accompanied by rigidity which the heart undergoes—this change consisting of a bulging of its anterior surface through its entire length. The effect of this sudden bulging of the rigid parietes of the ventricles is felt chiefly at the apex, because a thick mass of spongy lung which absorbs and neutralizes the force of the impulse intervenes over the rest of the heart's surface. A full expiration, by diminishing the size of the intervening portion of lung, extends the limits of the impulse, and the same result follows when the body is bent forward.

627. The strength of the impulse, and the extent of surface over which it is felt, vary greatly in disease. When the parietes of the heart are thickened at the expense of the cavities (concentric hypertrophy), the extent of impulse being scarcely greater than natural, its force is much augmented. When, on the other hand, the ventricles are diminished in thickness, the impulse is less forcible. If thickening of the walls is accompanied by increase of the size of the cavities, in which case the heart will be greatly enlarged, the impulse is both

stronger and more extensive, and may become perceptible over a space of five or six square inches. When the walls are thin and the cavities enlarged, the impulse will be of less force, but of greater extent.

628. Fluid in the pericardium renders the impulse indistinct, and the place in which it is felt variable. Adhesions between the heart and pericardium, on the contrary, confine the impulse to the same spot, so that change of posture, and the different states of the parietes of the chest in inspiration and expiration, have little or no effect upon it. Tumours formed within the chest and various diseases of the lungs may displace the heart, and cause the spot in which its impulse is felt to vary. Congenital transposition of the heart will have the same effect. The impulse will be more distinctly felt, *cœteris paribus*, when the contraction of the ventricles is abrupt.

629. When the heart acts strongly, and especially in emaciated subjects, its movements may be seen as well as felt, and their force, extent, and nature will often furnish useful indications. When the heart is enlarged, these movements may be distinctly perceived in the epigastric region.

630. The heart is also subject to various irregularities in its action; such as double and triple impulse, depending generally on spasmodic and partial contraction of the ventricles, and on irregular transmission of blood from the auricles; to intermittence, inequality, increased or diminished force, &c. As most of these irregular actions of the heart affect the pulse, and produce appreciable changes in it, they will be best considered under that head.

631. *Sounds of the heart.*—The natural sounds of the heart are two in number—a dull, prolonged sound, synchronous with the impulse of the heart, and consequently with the contraction of the ventricles and the pulse in the larger arteries, and an abrupt, clear sound. The second sound immediately succeeds the first, and is followed by an interval of silence. The first sound is loudest over the middle of the ventricles, the last over the site of the semilunar valves, and for a short distance upwards along the sternum. They are best distinguished when the pulse is slow, and they are more clear in emaciated than in stout persons. We may hear them in our own persons when lying down, especially on the left side; and in rare instances of disease they have been heard even at a short distance from the patient. The intensity of the sound diminishes as the distance from the præcordia increases.

632. In stout persons, the sounds are limited to the region of the heart itself; in narrow-chested persons, and in children, they may be heard all over the chest, before as well as behind. Any cause which increases the conducting power of the contents of the chest extends the limits within which the sounds are heard. Thus when the lungs are consolidated, as in pneumonia, phthisis, &c., the sounds of the heart are heard much beyond their usual limit. Should consoli-

dation be confined to the right side, the sounds of the heart would be heard more distinctly on that side, both before and behind, than on the left, and this fact may become a means of diagnosis.

633. *Cause of the sounds.*—Much difference of opinion has existed on this subject, and many careful experiments have been made. The majority of medical men now agree in attributing the first sound to the contraction of the ventricles, and the second sound to the reaction of the column of blood in the aorta and pulmonary artery on the semilunar valves, by which those valves are suddenly closed with a sort of click. Some high authorities have attributed both sounds to the closing of the valves, the first sound being due to the closing of the tricuspid and mitral valves, the second to the closing of the semilunar valves.

634. In support of the opinion which attributes the first sound to the contraction of the ventricles, it may be stated that the "bruit musculaire" is certainly a sufficient explanation; for no one who has placed his head upon the pillow, and contracted his masseter muscles with varying degrees of force and rapidity, can have failed to recognize the first sound of the heart in every degree of distinctness which it exhibits in healthy persons, from the dull, prolonged sound which it has when the circulation is tranquil, up to the cooing sound which accompanies its more powerful and rapid contractions. It is a strong confirmation of this view that a strong contraction of the abdominal muscles produces a sound not to be distinguished from it.*

635. The sounds of the heart may be changed in intensity or in kind. An increase or diminution of *intensity* is of very common occurrence. An increased loudness of sound is often heard during nervous palpitations, both by the patient himself and by his attendants; it may also be produced by dilatation of the ventricles accompanied with thinness of their parietes. In the former case, the impulse is at the same time increased; in the latter, diminished. On the other hand, the sounds may become so feeble as to be heard with difficulty; as is the case in general debility, or in debility of the heart itself, in obstructed pulmonary circulation, in cases where the heart is overloaded with blood, in softening of its fibres, and in excessive hypertrophy. In the latter case, there will be strong impulse with weak sounds.

636. In cases of nervous palpitation, and after violent exercise, both sounds of the heart are unusually distinct, the action of the muscular fibres being strong and abrupt, and the elastic reaction of the aorta closing the valves with a sudden jerk: hence the loudness of the first sound and the peculiar abruptness of the second.

637. But besides these differences in degree, there are other sounds present in certain unusual or diseased conditions of the circulation.

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* Report on the Motions and Sounds of the Heart. Transactions of the British Association, 1841.

Some of these belong to the heart, and others to the blood-vessels. They are the following:—the *bellows sound* (bruit de soufflet), the *simple blowing sound*, the *hissing sound*, the *sawing sound* (bruit de scie), the *rasping sound* (bruit de râpe), a *humming sound* (bruit de diable), a *buzzing sound* (bruit de mouche), a *whizzing sound*, and peculiar musical sounds, such as cooing, whistling, &c.

638. The sounds heard over the region of the heart itself, or in the large vessels which spring from it are chiefly the bellows sound and its modifications—viz., the sawing or rasping sound, and the several musical sounds.

639. The *bellows* sound is always produced when there is a marked disproportion between the force of the heart's contractions and the size of the tubes or orifices through which the blood has to pass. It may arise—1, in persons in perfect health during very violent contraction of the heart, the arteries retaining their normal size, as in nervous persons during violent palpitations, the heart contracting both quickly and forcibly; in chlorotic females, arising, as it is thought, from a thin condition of the blood; and in cases of great debility from sudden hæmorrhage. In all these cases, the sound is not constant. When present it bears a close resemblance to the panting noise of a locomotive, as it starts on its journey. 2. From narrowing of the orifices, the heart contracting with its usual force, or with increased violence; as where the orifice of the aorta or pulmonary artery is contracted, with or without enlargement and hypertrophy of the corresponding ventricle. 3. From narrowing of the orifices in consequence of diseased formations, such as vegetations and diseased incrustations on the valves, the consequence of inflammation, or polypus concretions formed during life. 4. From dilatation of one or more of the orifices of the heart, with inefficiency of the valves, as in cases of adhesion of the aortic or auriculo-ventricular valves to the adjacent parietes.

640. The young stethoscopist must be guarded against confounding a rapid tubular respiration with a *bruit de soufflet*. If there should be any doubt as to the true cause of the sound, the patient must be made to hold his breath.

641. Most of these cases resolve themselves into a disproportion between the force of the heart's beat and the size of the orifices, or into some obstacle to the flow of blood. The position in which they are heard, and the sound of the heart which they accompany, will often enable us to fix upon the precise seat and cause. Thus, sounds heard only in the region of the heart or over the position of its valves, and becoming indistinct when the ear is made to follow the course of the large arterial trunk, but increasing in distinctness as the ear approaches the apex of the heart, may be ascribed to disease of the auriculo-ventricular valves; or to causes external to the heart itself, and having the pericardium for their seat. On the other hand, sounds heard over the position of the valves, and remaining equally distinct

or increasing in distinctness, as the ear follows the course of the large vessels, may be referred to diseases of the coats or of the semilunar valves of the aorta or pulmonary artery. Of the two auriculo-ventricular valves, the mitral valve is the most likely seat of disease. Of the two large arteries and their valves, the coats and valves of the aorta are much the most liable to alterations of structure.

642. If the abnormal sounds accompany the first beat of the heart, they are most probably due either to disease of the auriculo-ventricular orifices, of the valves of the arteries, or of the coats of the arteries themselves. When they accompany the second sound, they are most likely to arise from disease of the aortal valves. If they are heard with both sounds, they may be complications of disease of the auriculo-ventricular valves with disease of the valves of the aorta or pulmonary artery; or of disease of the coats of the aorta as well as of its valves. The position in which they are heard must be taken into account in all these cases.

643. A more minute diagnosis of the causes of abnormal valvular sounds may be arrived at by considering the position of the valves in connexion with the direction in which the sounds due to them are most readily conducted. In the case of the tricuspid valve, it is natural to expect that the valvular sound would be conducted by the walls of the right ventricle, so as to be most distinctly perceived about the attachment of the right columnæ carneæ. In like manner, it is to be expected that abnormal sounds due to disease of the mitral valve will be most distinctly heard at the point of attachment of the left columnæ carneæ, or, in other words, at the apex of the heart. So also with the abnormal sounds due to disease of the coats or valves of the two great arteries. As the coats of those arteries will be the best conductors of sounds produced at the roots of those arteries themselves, or in any part of their course, the sounds will continue distinctly audible along the tract of the respective vessels, but become less and less distinct as the ear is made to travel in a direction from the base to the apex of the heart. Aortal murmurs, therefore, will continue distinct behind the middle of the sternum, and in the direction of the right sub-clavicular space, while abnormal sounds due to disease of the coats or valves of the pulmonary artery, while becoming indistinct in that direction, will be most distinct at the left of the sternum, between the second and third ribs, and will continue distinct in the tract of the left pulmonary artery, or for a short distance in the direction of the left sub-clavicular space.

644. The following diagnosis of valvular sounds is in accordance with this statement.

1. A murmur with the *first* sound of the heart heard over the site of the semilunar valves, and distinct at *c* (Fig. 40, p. 159), is *aortic.*

2. A murmur with the *first* sound heard in the same situation, but distinct at *d* is *pulmonic.*

3. A prolonged murmur with the *second* sound loudest over the site of the semilunar valves, is due to regurgitation through the semilunar valves,—of the aorta if the sound is loudest in the direction *c e;* of the pulmonary artery, if it is loudest in the direction *d f*; but in either case becoming less intense, as the ear is made to travel from the base towards the apex of the heart.

4. A murmur with the *first* sound, loudest at *f* is from tricuspid regurgitation.

5. A murmur with the *first* sound, loudest at *e* is from mitral regurgitation.

6. A murmur with the *second* sound, loudest at *f* is from contraction of the mitral valve; if loudest at *c* it is from contraction of the tricuspid.

Lastly, as a general rule, a murmur with either sound distinct at *c* and *d* is semilunar; if distinct at *e* and *f* it is auricular.

645. The sounds heard in the position of the heart, and which arise from causes external to it, are friction sounds, generally double, and in rare cases triple or fourfold. They arise from depositions of coagulable lymph on the surface of the pericardium, or from other morbid formations in the same situation. These sounds, too, are of limited extent, and are not heard in the course of the large vessels. They resemble those produced by depositions of lymph on the surface of the pleura, and vary in intensity, from a sound closely allied to the *bruit de soufflet*, to the harsh creaking sound produced by the folding of new leather.

646. In cases of abnormal sound, the hand applied over the spot where the sound is heard, perceives a peculiar *thrilling vibratory motion*, resembling that felt on touching the back of a cat in the act of purring. This has been named the purring tremor (*fremissement cataire*); a similar thrill is sometimes felt under strong pressure, in the healthy arteries themselves, after profuse loss of blood, and in anæmia. It is also present over aneurismal tumours, in aortic dilatations, in arterial varix, and in valvular disease admitting of regurgitation.

647. The sounds heard in the blood-vessels remote from the heart consist chiefly of the bellows murmur in different degrees of intensity, which may always be produced both in the arteries and veins by the pressure of the stethoscope, but is most distinctly heard in chlorotic females, and after hæmorrhages. It is heard in the veins of the uterus during pregnancy, but may be readily produced by pressure of the stethoscope on the iliac veins; hence the necessity of using caution in these examinations.

648. The humming sound (bruit de diable) and the buzzing sound (bruit de mouche) are also heard in different states of the vessels, and may be produced in the large veins by the pressure of the stethoscope. They may be heard in most anæmic females by placing the stethoscope

with a tolerably firm pressure in the supra-clavicular space. The sounds are generally most distinctly heard on the left side, but, in rare instances, they are perceptible only on the right side or only on the left. The cause of this exception to the rule is obscure.

649. This humming sound is distinguished from sounds due to the motion of the blood in the arteries by being continuous. Sometimes, as in extreme cases of anæmia, a humming sound, due to the motion of the blood through the veins, is heard at the same time with a bellows sound caused by the motion of the blood through the arteries. This combination is best heard in the space above the clavicles.

650. Other sounds heard in the blood-vessels are the peculiar whizzing or grating sound of aneurism, and a similar sound from the passage of blood through an accidental opening from an artery into a vein (aneurismal varix).

651. Much information may be obtained by placing the hand upon the pulse at the wrist, at the same time that the ear is applied to the seat of the abnormal sounds. In the case of sounds heard in the region of the heart, and attributed to disease of the auriculo-ventricular valves, if the sound precede the pulse, we may attribute it to the entry of the blood into the ventricle,—if it is synchronous with it, to reflux. In this latter case, the presence or absence of the venous pulse, that is to say, the pulsation of the large veins caused by regurgitation of the blood into them, will enable us to decide as to which side of the heart is the seat of the disease.

5. THE PULSE.

652. By the ear or by the hand applied to the region of the heart, we may count the number, the force, the quickness, the regularity, and the degree of equality of its beats; but the pulse teaches us this and something more. It is a measure not only of the number, force, quickness, regularity, and degree of equality of the heart's contractions, but also of the quantity of blood sent forth at each beat. Hence it is a better measure of the circulation. It would be a perfect one were it not that the coats of the arteries vary in their degree of contractility. But this variation, whilst it impairs the value of the pulse as a measure of the circulation, gives it an additional claim to attention as a criterion of the state of the nervous system; for this it is which modifies the contractility of the arteries.

653. The fallaciousness of the pulse has passed into a proverb, and the proverb has furnished a good excuse for the neglect with which it has been treated. Substitute the word "difficult," for the word "fallacious," and we have a motive for industry instead of an apology for idleness. The pulse can only be fallacious to the extent to which we are ignorant of it; it will always remain difficult even to

those who understand it best. The difficulties which attach to the subject are the same which beset every part of the study and practice of medicine, and they spring from the same causes—of which the chief are the original difference in degree existing between all the functions of the human body in health, the variable intensity of the causes of disease, and the numerous combinations of which those causes are susceptible.

654. Some precautions are necessary in examining the pulse, and some directions are required. The first precaution to be observed is, to wait a certain time till the emotions commonly occasioned by the presence of the medical attendant have subsided, for such emotions have a marked effect upon the circulation. The mode in which the pulse is felt is also of some consequence. For the purpose of counting the number of beats, a single finger may be used; but in order to observe the more minute changes which it undergoes, the four fingers of the opposite hand should be applied in the course of the radial artery, with a moderately firm and equal pressure. By compressing the artery with the ring or little finger, we can ascertain by the forefinger the degree of compressibility. In infants and very young children, it is often difficult to count the pulse at the wrist, and in these cases the beat of the heart should be preferred.

655. Of all the characters of the pulse, its frequency is that which is most easily ascertained. This usually corresponds with the number of the heart's contractions: it can never exceed that number, though it may fall short of it. In certain forms of disease of the heart, the quantity of blood which the ventricles receive is so small, that it makes no impression on the mass of the circulating fluid, and the impulse does not reach the radial artery; or the heart contracts without having any blood in it; or some pressure, temporary or permanent, may exist in the course of the artery: in all these cases, the pulse is imperceptible, and we miss some of its beats. In syncope, too, all the beats of the heart are so feeble that no pulse can be felt at the wrist. These are some of the few exceptions to the rule that the pulse is an accurate measure of the frequency of the heart's contractions.

656. The number of the pulse in health varies with age, sex, and temperament; with posture, time of day, sleep, exercise, food, mental emotions; temperature and density of the air; quantity of blood contained in the system; and the strength and vigour of the frame. The principal information which we possess on these subjects is condensed in the following pages:—

657. AGE.—*Infancy.*—The frequency of the pulse is very variable in young infants. According to Quetelet, the numbers immediately after birth, both for males and females, are as follow:—

Maximum, 165; Minimum, 104; Mean, 135; Range, 61.

The following numbers are taken from Billard; the averages are approximations :—

	Max.	Min.	Mean.	Range.
1 to 10 days	180;	less than 80 (in 18)	106;	more than 100
1 to 2 months	150;	70	103;	80
1 to 3 months	100;	70	87;	30

Hence it appears that the pulse of the infant at birth, and for some time after, has a very variable frequency, and is little to be depended upon as a test of the state of the health.

658. From infancy till towards the middle of life, the pulse progressively diminishes in frequency, to increase again slightly in the decline of life. The following table, founded upon between 600 and 700 observations, of which the greater number were made by myself, shows the average and extreme numbers of the pulse, without distinction of sex, time of the day, or posture of the body. The number of observations at each age was either 20 or 25 :—

Age.	Max.	Min.	Mean.	Range.
1	158	108	128	50
2	136	84	107	52
3	124	84	106	40
4	124	80	105	44
5	133	80	101	53
6	124	70	95	54
7	128	72	90	56
8	112	72	92	40
9	114	65	87	49
10	120	76	91	44
11	100	56	84	44
12	120	70	94	50
13	112	70	84	42
14	114	68	86	46
15	112	60	84	52
16	104	66	83	38
17	102	54	76	48
18	104	58	74	46
19	108	60	76	48
20	106	52	72	54
21	99	59	74	40
22	96	41	68	55
23	100	60	74	40
24	84	52	71	32
25	88	59	73	29

659. The following table presents the number of the pulse at different ages, deduced from an average of twenty-five observations at each age specified. All the observations were made by myself, in apparently healthy persons, fasting, in a state of rest, in the middle of the day, and in a sitting posture :—

AGE.	MALES.				FEMALES.			
	Max.	Min.	Mean.	Range.	Max.	Min.	Mean.	Range.
1 week,	160	104	128	56	160	104	128	56
2 to 7 years	128	72	97	56	128	70	98	58
7—14	108	70	84	38	120	70	94	50
14—21	108	60	76	48	124	56	82	68
21—28	100	53	73	47	114	54	80	60
28—35	92	56	70	36	94	62	78	32
35—42	90	48	68	42	100	56	78	44
42—49	96	50	70	46	106	64	77	42
49—56	92	46	67	46	96	64	76	32
56—63	84	56	68	28	108	60	77	48
63—70	96	54	70	42	100	52	78	48
70—77	94	54	67	40	104	54	81	50
77—84	97	50	71	47	105	64	82	41

660. The pulse of the adult male, then, may be stated at 70, that of the adult female at 80; the highest number is somewhat less than 100 in the adult male, and somewhat more than 110 in the adult female; the least number in each is about 50. The range (the difference between the highest and lowest numbers) extends from 28 to 56 in the male, average 43; and from 32 to 68 in the female, average 48. The lowest number recorded in the table is 46; the lowest observed by Floyer was 55.

661. Much lower frequencies have, however, been met with in healthy persons. Heberden records 42, 30, and even 26 beats in a man of 80; Fordyce, 26, in an old man in the Charter-house; in a young man whose pulse is not included in the table, as he laboured under slight dyspepsia, I have repeatedly counted as low as 38 beats; and this is the lowest I have met with in many hundreds. Pulses as low as 16 or even 14 beats are on record, but it is doubtful whether the persons in whom they occurred were healthy. Falconer has observed pulses of very low frequency in women, viz., one of 36 and another of 24; and Dr. Graves mentions one of 38.

662. In disease, extraordinary low frequencies of the pulse have been observed: one case is reported by M. Piorry, in which it beat 17 times in a minute; in a case of epilepsy by Sir W. Burnett, the number was 14; and in a remarkable case of injury to the upper part of the spine, followed after an interval by fits of syncope with convulsions, the pulse was usually about 33, but fell during the fits to 12, 10, 8, "and at three or four different times, when the patient was quite insensible, and not in a fit," seven and a-half in a minute.*

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* Medico-Chir. Trans. 1841; Reporter, Mr. Holberton, of Hampton.

These low frequencies of the pulse are generally little affected by stimuli, and, as in the case reported by Dr. Graves, remain unaltered by febrile attacks.

663. It is extremely probable, on the other hand, that exceptions may exist to the frequency of the healthy pulse, of an opposite kind—that is, cases of great frequency; but I have not met with any well-authenticated instances. In disease, extraordinary frequencies of pulse have been counted. Dr. Joy has counted 200 in a case of acute hydrocephalus, and I am credibly informed by a medical man, a near neighbour of my own, that during occasional violent fits of palpitation he has counted in his own person 250 beats in the minute, and that a medical friend who called to see him in the fits corroborated his statement as to the number. Heberden counted a pulse of 180, though Floyer thinks that the greatest number which can be distinctly counted is 140. I have myself counted upwards of 170 in a case of phthisis, and in a case of typhus fever, occurring in a boy ten years of age, and during the rapid formation of diffused abscess of the arm, I distinctly counted 264 beats in the minute, being nearly nine beats in two seconds.

664. *Sex.*—It will be seen, by comparing the two columns of the foregoing table, that the pulse of the female has nearly the same frequency as that of the male up to seven years, but that at more advanced periods of life the female pulse exceeds the male by from 6 to 14 beats, the average excess being 9 beats. The pulse, too, has a greater range in the female than in the male; that is to say, there is a greater difference between its highest and lowest numbers. This happens in consequence of the female pulse being much more frequent in many instances than the male, whilst in others it falls nearly as low.

665. As it is not easy to bear in mind the number of the pulse in the two sexes for the several periods specified in the tables, the following approximative figures may assist the memory:—

At birth . . .	140
Infancy. . . .	120
Childhood . . .	100
Youth	90
Adult age . . .	75
Old age . . .	70
Decrepitude . .	75–80

Assuming these to be the numbers for the male, an addition of about 10 beats will have to be made to the last three lines to give the numbers in the female.

666. *Temperament.*—Nothing is known with certainty of the influence of temperament on the pulse. It is probable that the pulse is more frequent in the sanguine and nervous than in the lymphatic and bilious; but I have counted a pulse of 50 in a youth under 20 years of age, with all the marks of the sanguine temperament.

667. *Posture.*—In the healthy adult male the mean frequency of the pulse in the different postures is as follows :—

Standing, 79; sitting, 70; lying, 67; including all exceptions to the rule.

Standing, 81 ; sitting, 71 ; lying, 66 ; excluding all exceptions to the rule.

In the adult female of the same mean age the numbers are,—

Standing, 89 ; sitting, 82 ; lying, 80 ; including all exceptions to the rule.

Standing, 91 ; sitting, 84 ; lying, 80 ; excluding all exceptions to the rule.

668. The extremes, however, are very remote from these mean numbers. Thus, in the male, the difference between standing and sitting has been observed as high as 26, and as low as 0 ; that between sitting and lying as high as 18, and as low as 0 ; and that between standing and lying as high as 44, and as low as 0. In the female, in like manner, differences scarcely less marked have been observed. Numerous exceptions also exist to the rule that the pulse is more frequent sitting than lying, and standing than sitting. All these facts should be borne in mind at the bedside. The effect of change of posture on the same frequency of the pulse is nearly twice as great in the male as in the female, and nearly three times as great in adults as in early youth.

669. The effect of change of posture increases with the frequency of the pulse, as is seen in the following tables :—

MALES.

	51–70	71-90	91–110	111–130
Standing	61	81	101	120
Sitting	55	68	82	93
Lying	52	67	74	81
Difference between standing and lying	9	15	27	39

FEMALES.

	61–80	81–100	101–120
Standing	71	92	108
Sitting	67	85	97
Lying	63	83	90
Difference between standing and lying	8	12	18

670. The exceptions to the general rule also decrease as the frequency of the pulse increases, and for the higher frequencies of the pulse entirely disappear. The effect of change of posture on the same frequency of the pulse is greater in the morning than in the evening. When the head is placed lower than the body the pulse falls.

671. The cause of the different frequency of the pulse in different postures is the different amount of muscular contraction required to support the body in those postures.

672. The effect of change of position is much increased by debility; it is greatly diminished in phthisis pulmonalis. The pulse is said by Dr. Graves to be unaffected by posture in hypertrophy of the heart; but this statement requires confirmation.

673. *Period of the day.*—The pulse of the healthy male, as a general rule, is more frequent in the morning than in the evening, and diminishes progressively as the day advances. To this rule there are many exceptions in males, and still more in females. The pulse also falls more rapidly and uniformly in the evening than in the morning. It is also a general rule, that exciting causes of all kinds act more powerfully in the morning than in the evening.

674. In experiments made upon my own person, I found that the effect of the same food on the same frequency of the pulse was, taking one experiment with another, nearly twice as great, and lasted more than three times as long, in the morning; whilst in more than one instance the same food which in the morning raised the pulse from 5 to 12 beats, and kept it above its natural number for one or two hours, produced no effect whatever in the evening. This fact has an important bearing on the administration of food and remedies in disease.

675. *Sleep.*—The pulse falls considerably in sleep. In Quetelet's observations, there was a difference of 10 beats in an adult female, the same difference in a girl from three to four years old, and in a boy from four to five years a difference of 16 beats. Sleeplessness excites the circulation.

676. *Exercise.*—Muscular exertion increases the frequency of the pulse more than any other cause. It may raise it to upwards of three times its natural frequency. Change of posture is but a particular case of this. After severe and long-continued exertion, as I have ascertained experimentally, the pulse suffers the same collapse as the other functions, and falls much below its natural number. Passive exercise also excites the pulse.

677. *Food.*—The pulse is but little affected by vegetable food, more by animal substances, and most of all by warm drinks. Spirituous liquors and tobacco, even though used habitually, increase the frequency of the pulse. Cold liquids lower it.

678. *Mental emotions.*—These have a marked effect on the pulse,

the exciting passions increasing its frequency, the depressing passions lowering it. The apprehension which patients feel in the presence of their physician is well known to excite the pulse, and the caution to wait till the excitement has ceased before the pulse is counted is as old as Celsus.

679. *Temperature of the air.*—Cold air lowers the pulse, warm air excites it. In Sir C. Blagden's experiments, in which he exposed himself during eight minutes in air heated to 260°, the pulse was 144, or double its natural frequency.

680. *Density of the air.*—On the summit of Mont Blanc, De Saussure found the pulses that beat 49, 66, and 72 times respectively at Chamounix, raised to 98, 112, and 100.

681. *Quantity of blood contained in the system.*—The pulse is more frequent in that degree of plethora which falls short of overloading the heart with blood; its frequency is but little increased where the heart is oppressed. Compression of the arteries raises the pulse by producing the first degree of plethora. A slight diminution of the quantity of blood lowers the frequency of the pulse; a considerable diminution raises it.

682. *Debility.*—In debility without disease, the pulse falls, but its frequency is increased in extreme debility, or where debility is complicated with irritation.

683. The more common causes of increased frequency of pulse in healthy persons, then, are the following:—muscular exertion, active and passive exercise, a change from a posture requiring little muscular effort to one requiring more exertion, food (especially warm drinks), a high temperature, diminished pressure of the air, extreme debility, sleeplessness, the first degree of plethora, and exciting passions and emotions.

684. The principal causes of diminished frequency, on the other hand, are,—sleep, fatigue (provided it be not carried to excess), continued rest, debility without disease (provided the debility be not extreme), depressing passions, cold applied externally or taken internally, increased atmospheric pressure, a change from the standing to the sitting, or from the sitting to the recumbent posture, and the inverted position of the body.

685. Other characters of the pulse, besides its frequency, deserve notice. The pulse of the healthy male may be described as regular, moderately full, compressible, and rising rather slowly under the finger; that of the female is smaller and quicker in the beat, as is also the pulse of the child. The pulse of persons of a sanguine temperament is full, hard, and quick; that of the lymphatic temperament, slower in the beat. In old age the pulse is often rendered hard by the increased firmness of the arteries

686. Exceptions also occur in healthy persons to the regularity of the pulse, instances having been observed in which the pulse was irregular [illegible] even intermittent in health, and regular in disease, resuming its intermittent character on recovery. In some persons this irregularity occurs on every slight attack of indigestion, especially where much flatulence is present.

687. The frequency of the pulse, then, though a point of much importance, is by no means the only one which demands the attention of the practitioner; there are other characters of at least equal value. The following description and explanation of them will be found useful:—

688. The impression communicated to the finger by the pulse is compounded (*a*) of the beat of the heart, (*b*) of the reaction of the aorta and large vessels, (*c*) of the condition of the coats of the artery itself, (*d*) of the consistence of the blood, and (*e*) of the state of the aortic valves.

689. (*a*) The characters of the pulse which depend upon the degree and mode of the heart's contraction are the following:—

Number of the heart's contractions.—Pulse *frequent, infrequent.*

Regularity of the heart's contractions.—Pulse *regular, irregular, intermittent.* (This last term should be applied to an arrest of the heart's action occurring at regular intervals.)

Quantity of blood expelled at each contraction of the heart. Pulse *large* (full), *small.* If the quantity sent out at each beat is the same, the pulse is *equal,* if different, *unequal.*

Time occupied by each beat of the heart.—Pulse *slow* (labouring), *quick* (sharp). An extreme quickness of pulse constitutes the *jerking* or *bounding* pulse of authors.

690. (*b*) The influence of the elastic reaction of the large arterial trunks on the pulse is shown in cases of dilatation of the aorta with loss of elasticity, and in aneurism. The firm and strong reaction of the healthy elastic coat produces a *steady* pulse; the absence of this reaction occasions the peculiar *thrilling* pulse of aneurism. The degree of elasticity of the arteries themselves produces the following modifications:—

Elasticity of the arteries increased.—Pulse *hard* (strong, sharp, wiry, incompressible).

Elasticity of the arteries diminished.—Pulse *soft* (weak, yielding, compressible).

Elasticity lost in the large arterial trunks.—Pulse *thrilling, vibrating.*

691. (*c*) The character of the pulse is further modified by the degree of contractility of the muscular fibres which the coats of the arteries contain. This condition may be conveniently expressed by the word *tone.* It exists in every degree from the tense state of high nervous

excitement or rude robust health, down to the flabby condition of collapse, shock, or extreme debility.

692. (*d*) The influence which the consistence of the blood has in modifying the pulse is best seen in extreme cases of anæmia, in which an important element of the blood being deficient, the pulse assumes the *thrilling* character which in other instances is due to a loss of elasticity in the great arteries.

693. (*e*) The state of the aortic valves has a very marked effect upon the pulse. In their healthy state, they contribute by their prompt closure to keep the arterial system full of blood, and thus conduce to the steady character of the pulse. But when the valves are diseased in such a manner as to prevent their closure, and to allow of regurgitation into the left ventricle, each pulse is peculiarly distinct, the wave occasioned by the contraction of the ventricle being felt as if the blood were 'shot under the finger,' the vessel in the interval being unusually empty. This pulse is an exaggeration of the *jerking* pulse of anæmia.

694. The foregoing characters of the pulse are rarely, if ever, met with separate, but admit of various combinations, of which the following are the most important:—

Pulse *frequent, large, soft.*—(Compounded of a frequent beat of the heart, a large quantity of blood sent out by each contraction, and an artery wanting in elasticity and tone.) This pulse accompanies the premonitory stage of many febrile and exanthematous diseases, such as scarlatina, cynanche tonsillaris, erysipelas, the first stage of pneumonia, &c. It is also present in dilatation of the left ventricle of the heart.

Pulse *frequent, large, hard.*—(Compounded of a frequent beat of the heart, a large quantity of blood sent out at each beat, and an artery full of elasticity and tone.) The pulse of the first degree of plethora, and of hypertrophy with dilatation of the heart.

Pulse *rather frequent, large, slow* (labouring).—(Compounded of a rather frequent and a slow beating of the heart, and a large quantity of blood sent out at each contraction.) The pulse of a greater degree of plethora, the heart overloaded with blood.

Pulse *frequent, large, hard, quick.*—(Compounded of a frequent and quick beat, a large circulation of blood, and an artery full of elasticity and tone.) The pulse of inflammatory fever.

Pulse *frequent, large, hard, thrilling.*—(Compounded of a frequent beat of the heart, a large quantity of blood sent out at each beat, the artery at the wrist elastic and full of tone, with a loss of elasticity in the larger arterial trunk.) The characteristic pulse of aneurism and of dilatation of the aorta without obstruction to the flow of blood.

Pulse *frequent, small, quick.*—(Compounded of a frequent beat of the heart, a quick contraction, and a small quantity of blood sent out at each beat.) This is the characteristic pulse of phthisis in males, and of anæmia in females. In a moderate degree, indeed, it is the character which distinguishes the female pulse, and which is present in an exaggerated form in all the less severe disorders of the female. This pulse, with the addition of extreme hardness or tension, is the pulse of hypertrophy with contraction of the heart.

Pulse *unequal* and *irregular, frequent* or *infrequent.*—(Compounded of a variable quantity of blood sent out at each contraction, and of contractions performed in unequal times.) As the quantity of blood sent forth by the heart may depend upon one of two causes,—a diminished supply from the auricle, or a want of power in the heart to send forth all the blood which it receives,—this pulse may indicate mitral valve disease, or atrophy or softening of the heart. It may depend, also, on causes which render the supply of blood to the left auricle variable. Hence it occurs in some diseases of the lungs. A similar pulse may occur suddenly as the consequence of the formation of a large polypus in the left ventricle, or as the result of pressure exercised upon the heart by serous effusion in pericarditis.

Pulse, *infrequent, large, hard.*—(Compounded of an infrequent beat of the heart, a full supply of blood, and an artery in a state of elasticity and tone.) A pulse often met with in apoplexy before depletion has been practised, in hydrocephalus, in compression of the brain, in narcotism, and in simple hypertrophy of the left ventricle.

Pulse *infrequent, quick.*—(Compounded of an infrequent and a quick beat of the heart.) A pulse sometimes met with in the hysteric female, and in very rare cases of pulmonary consumption in the male.

695. These are some of the many combinations of the chief elements, so to speak, of the pulse. They are given partly as examples of the employment of terms, and partly as hints to those who may wish to follow out the study of the pulse.

696. Taken in combination with other symptoms, the pulse furnishes important indications in all diseases; whilst in some cases of frequent occurrence, as phthisis pulmonalis and affections of the heart, it often forms the earliest clue to the existence of an obscure and lurking malady.

It must not, however, be supposed that the pulse is free from the uncertainties which attach to all the symptoms of disease. On the contrary, we encounter, from time to time, very remarkable exceptions to general rules. There are no characters of the pulse, for instance, more generally present than those which have just been pointed out as peculiar to phthisis in the male subject; but among some hundreds of cases conforming to the rule of increased frequency, we now and then meet with a single case in which the number falls short even of the average number in health. I have met with two such cases; in one of which, a case of undoubted phthisis, the pulse was only 64 in the erect posture. Though it is possible that the patient's pulse in health might have been even less frequent than this, it is highly probable that it formed a real exception to the rule.

697. Besides the simple characters of the pulse already mentioned, others of less frequent occurrence, and of more obscure nature, have been mentioned by authors, of which the following are examples. The redoubled pulses (*dicrotus*, *bisferiens*, *bisiliens*), when two strokes follow each other rapidly, and are separated from the two succeeding beats by an interval of repose; a pulse which is said to indicate approaching hæmorrhage; the *incident* pulse (*incidens*, *incidnus*), when the second pulsation is weaker than the first, the third than the fourth, after which there is a stroke as strong as the first, and so on; this is the critical pulse of the old writers; the *pulsus caprisans*, admirably named, but rarely felt; it consists in a small pulse, succeeded after a short interval by a large one, conveying the impression of an unsuccessful effort, followed by the overcoming of an obstacle.

6. THE RESPIRATION.

698. The number and character of the respiratory movements, and the relation which they bear to the state of the circulation, frequently engage our attention at the bedside. In order to appreciate rightly the value of this sign of disease, it is necessary to bear in mind that the muscles of respiration are under the control both of voluntary and involuntary nerves, and that their subordination to the will renders them liable to all those affections of the voluntary muscles in which volition is suspended or impeded. Hence they are affected in hysteria, in chorea, and in tetanus.

699. As the muscles of respiration are subject to the influence of the will, it is necessary, in experiments or observations upon the number and character of the respirations, to avoid this source of fallacy. I have succeeded in accomplishing this purpose by the invention of an instrument which registers the number of respirations during a considerable interval, without requiring any attention on the part of the experimenter. (See § 568.)

700. At the bedside, the same object may be secured when the patient is lying down, by placing the hand on the abdomen as if with a view of counting the pulse. By relaxing the grasp upon the wrist, and allowing the hand to rise and fall with the movements of respiration, the number of respirations may be counted. In this manner the interference of the will, which is always called into play when the attention of the patient is attracted to the breathing, is avoided. By this means, too, the pulse and respiration may be counted in succession, and compared with each other. This precaution of holding the wrist while the breathing is being counted should be observed even when the respirations are audible, and we are counting them by the ear.

701. *Number of the respirations.*—The number of the respirations is subject to at least as great variety as that of the pulse, and has been still less inquired into. Little is hitherto known on the subject beyond a few rude estimates. The number of respirations in a minute

is usually stated at 18, or about one to every four beats of the pulse. It is variously stated by authors for the adult male at from 14 to 26 respirations in the minute.

702. The respiration, like the pulse, varies in frequency with age, sex, posture, and time of day; and is subject to great change during sleep.

703. *Age and Sex.*—Quetelet has made some interesting observations on the respiration at different ages, in males and females. The following table presents the results which he obtained from about three hundred observations on males, and a smaller number on females:—

	Number of the Respirations.	
AGE.	MALE.	FEMALE.
At birth	23 to 70	27 to 68
5 years	32	..
15—20	16 to 24	19
20—25	14 to 24	17
25—30	15 to 21	..
30—50	11 to 23	19

704. The range of my own respiration, from my twenty-eighth to my thirtieth year, as founded upon numerous experiments, with the self-registering instrument, in different postures and under different circumstances, was 12 to 22.

705. Vierordt obtained, as the result of observations on his own person, in the *sitting* posture, a maximum of 15, a minimum of 9, and an average of 12. Hutchinson, in experiments on 1,714 healthy males in the same posture, found a minimum of 6 respirations, and a maximum of 41; while the greater number were found to breathe 20 times in the minute, and a very considerable proportion between 16 and 24 times. It is probable that the highest numbers observed in Dr. Hutchinson's experiments occurred in men who had recently taken exercise. The lowest numbers are of very rare occurrence, and may perhaps be explained by the difficulty of counting the respiration accurately in any posture except the recumbent, and by any means except the pressure of the hand on the abdomen. The recorded frequency of respiration in the persons of the principal experimenters on that function ranges between 14 and 27.

706. *Posture.*—The results of a large number of observations, made on my own person, by the self-registering instrument already referred to, were as follows:—For a pulse of 64 the respirations were, standing, 22; sitting, 19; and lying, 13. Hence the rule which the pulse follows—viz., that the difference between standing and sitting is greater than that between sitting and lying, is inverted in the case of the respiration. The respiration in the sitting posture, for different frequencies of pulse, ranged from 15 to 21.

707. *Period of the day.*—The rule of the pulse is also inverted in respect to the influence of the time of the day, for whereas the pulse becomes less frequent as the day advances, the respiration increases in frequency. On comparing the same frequency of pulse morning and evening, I find that there are about 18 respirations in the evening for 17 in the morning. The same rule obtains in disease in both sexes, even in those cases where the pulse becomes more frequent in the evening. That degree of debility, therefore, which fatigue occasions both in health and disease, is accompanied by increased frequency of respiration.

708. *Sleep.*—Quetelet has examined the effect of sleep on the respiration. In a woman in her twenty-seventh year he found the respiration to be, awake, 27; asleep, 21. In two young children, the differences were 5 and 8 respectively. It appears from his experiments, that the respiration is more affected by sleep than the pulse.

709. The other causes which in health affect the frequency of the pulse, produce the same, or a similar, effect on the respiration. Thus, all causes which increase the frequency of the pulse and the force of the circulation, augment the number of the respirations. On the other hand, all causes of diminished frequency of pulse also lower the respiration. Thus, exercise increases the number of respirations, rest diminishes them: high temperatures increase the frequency both of the pulse and breathing, cold diminishes the frequency of both. Sleep, which lowers the pulse, has a still more marked effect upon the respiration. The only exception to the rule with which I am acquainted, is that of debility. It has been already stated, that debility without disease, provided it be not extreme, is accompanied by an infrequent pulse; the number of respirations, on the contrary, is increased in every degree of debility.

710. *Proportion which the respiration bears to the pulse.*—This has been variously estimated by authors. Quetelet, Burdach, Hutchinson, and the majority of physiologists, estimate the number at 1 to 4; Joy (Lib. Pr. Med.) and Dr. C. Hooker (Boston Medical and Surgical Journal, 1838) at 1 to 4½; Floyer at 1 to 5. No dependence can be placed on any of these estimates, as they were formed in ignorance of the effect of posture on the breathing. In experiments on my own person made with the self-registering instrument, the proportion has varied between 1 to 2·60 and 1 to 5·23. In the sitting posture, but for different frequencies of the pulse, it has varied from 1 to 2·61 to 1 to 5·00.

The chief causes of this difference are the posture of the body, the time of the day, and the frequency of the pulse itself.

711. *Posture.*—For a pulse of 64, the proportion of the respiration to the pulse, standing was 1 to 2·95; sitting, 1 to 3·35; and lying, 1 to 4·97.

712. *Time of day.*—The proportions morning and evening for the same frequency of the pulse are about 1 to 3·60 and 1 to 3·40.

713. *Frequency of the pulse.*—The proportion which the respiration bears to the pulse decreases as the pulse increases. Thus for a pulse of 54, the proportion was 1 to 3; for a pulse of 72, it was 1 to 4. As a general rule, the number of respirations increases with that of the pulse, but in a less rapid ratio, the proportion which the respiration bears to the pulse decreasing as the pulse increases. Further observations may slightly modify these and other statements, founded upon my own observations, but it is believed that they will be found in the main correct.

714. In disease, the number of the respirations varies within much wider limits than that of the pulse. The smallest number which I have counted is 6 in a female in a deep sleep, but not comatose, after attempting suicide by laudanum; and I have counted as few as 10 respirations in a case of paralysis. On the other hand, I have reckoned as many as 44 in a case of phthisis, 73 in a case of paralysis agitans, and 140 in a case of hysteric asthma. Floyer met with 60 respirations in a case of suffocative catarrh, and in a case of inflammation of the lungs in a child: on the other hand, he counted as few as 7 in more than one attack of asthma. Dr. Graves has recorded as small a number as 12, and as many as 50, in cases of fever. In Dr. Hutchinson's table (Medico-Chirurgical Transactions, vol. xxix., p. 226), among 1,714 observations on healthy adults in the sitting posture, one is recorded in which there were only 6 respirations in a minute!

715. With regard to the proportion which the respiration bears to the pulse in disease;—Floyer has found it as high as 1 to 2 in a case of suffocative catarrh, and as low as 1 to 14 in a case of asthma; Dr. Graves has observed as high a proportion as 1 to 2 in one case of fever, and as low a proportion as 1 to 20 in another. In the case of paralysis agitans already referred to, I counted a pulse of 72 and 73 respirations; in the case of hysteric asthma, 144 pulses and 140 respirations; in a case of transposition of the heart, 32 respirations to 46 pulses; and in a case of paralysis, 1 respiration to 6½ pulses. In a case of aneurism of the heart reported by Mr. Peacock (Prov. Med. Jour., No. 4, vol. ii.), there were 34 respirations to 33 pulses.

716. These remarkable variations in the number of the respirations as compared with that of the pulse are readily explained, if we reflect that the respiration is influenced by many other causes besides the quantity of blood sent to the lungs by the heart. Some of these causes are internal and some external. The principal internal causes are the state of the lungs themselves, and of the pleuræ by which they are invested. Among external causes are mechanical obstructions to the entrance of air, as by the pressure of tumours upon the air-passages, constriction of the chest, increased or diminished action of the muscles of respiration, &c. All these obstructions to the free play of the lungs, and the due performance of respiration, accelerate

the breathing; and this acceleration, whether accompanied by a feeling of uneasiness or not, has been called dyspnœa. As this is the principal symptom of all diseases of the lungs, and a concomitant of a great majority of the diseases of the heart, it will be useful to present the chief causes of it in a tabular form.*

CAUSES OF INCREASED FREQUENCY OF RESPIRATION.—DYSPNŒA.

	I. *Quantity of blood in the lungs increased.*	
	a. With quickened circulation.	Exercise, repletion, plethora (1st degree), inflammatory fevers, hypertrophy of the right side of the heart, &c.
	b. With obstacle to the return of blood to the heart.	Diseases of the mitral valve, pressure on the pulmonary veins, &c.
	II. *Quality of the blood altered.*	
	a. More venous than usual.	Morbus cœruleus, &c.
	b. Red particles deficient.	Anæmia, chlorosis.
	III. *Deficiency of oxygen in inspired air.*	
	a. Air pure, but small in quantity.	Air rarefied by high temperature, or diminished atmospheric pressure.
	b. Air defective in quality.	Non-poisonous gases, as nitrogen and hydrogen.
	IV. *Mechanical obstructions.*	
Internal.	a. Of the air tubes.	Diminished size of air tubes from thickening of their parietes, or from pressure, and accumulations of mucus, as in the death-struggle.
	b. In lungs themselves.	Congestion, hepatization, œdema, tubercle, &c.; emphysema, dilated bronchi, vomicæ, &c.
	c. In pleural sac.	Hydrothorax and pneumothorax, pleuritic effusions and adhesions.
	d. Caused by other internal organs.	Enlargement of the heart or lar vessels, aneurismal tumours.
External.	a. In parietes of the chest.	Malformations and distortions, ossification of cartilages, &c.
	b. In abdomen.	Enlarged viscera, tumours or dropsical effusions.
	V. *State of the muscles of respiration.*	
	a. Paralysis (partial).	Injuries of the spinal marrow, in the neck, &c.
	b. Debility.	From fatigue, exhaustion, after severe febrile affections, and at the approach of death.
	c. *Pain,* 1. In muscles.	In intercostals, diaphragm, or abdominal muscles, the sound muscles performing the respiratory movements.
	2. In surrounding parts.	In the abdomen in peritonitis, and in the chest in pleuritis, the muscles which cause the least pain acting alone.
	d. Spasm.	Tetanus, hydrophobia, &c.
	e. Other forms of augmented innervation.	Strong mental emotions; hysteria, asthma.

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* A similar table is given by Dr. Williams in Lib. Pr. Med. vol. iii. p. 25. Some use has been made of it in forming this scheme.

717. The chief causes of diminished frequency of the respiration are sleep and coma, however produced, whether by narcotics or by pressure on the brain. The respiration, therefore, is infrequent in apoplexy, and in poisoning by opium and carbonic acid.

718. Many other characters of the respiration, besides increased frequency, merit attention; as the full or deep, the small or feeble, the regular or irregular; the short, quick, and catching; the long, the labouring; the thoracic, the abdominal, the diaphragmatic, &c.

719. Increased or diminished frequency of the respiration taken alone is of comparatively little value; it is only when combined with observations on the pulse, or examinations of the chest by percussion and auscultation, that we learn its real signification. Thus, a frequent respiration, taken alone, may arise from any one of the many causes specified in the table; but a frequent respiration with an infrequent pulse, in the ascertained absence of any disease of the internal organs of the chest, would strongly indicate great debility, or, in the absence of this, hysteria. On the other hand, an infrequent pulse and respiration combined would as probably arise from some disease or injury of the brain or of the upper portion of the spinal marrow. Again, a frequent and quick respiration, in the absence of disease of the internal organs of the chest, and accompanied by acute pain of the parietes of the chest or abdomen, is at once explained by the existence of that pain, whether its seat be in the muscles or in the peritoneum.

720. Important indications may also be obtained by noting the number of the respirations day by day in acute diseases. In pneumonia, for instance, a daily diminution in the number of the respirations, with or without a similar change of the pulse, gives the best hope of recovery; in apoplexy or in narcotic poisoning, on the contrary, an increase in the number of respirations, especially if accompanied by an increased frequency of pulse, may be considered as a good symptom. So in convalescence from fever, where there is great debility, a diminished frequency of respiration, with a gradual increase in the number of the pulse, is a sign of returning strength.

721. In making use of these, as well as of the less important symptoms and signs of disease, the observer should always be on his guard against the common error of trusting too implicitly to any one sign, however valuable in itself, to the neglect of others which are capable of affording him useful information. In diseases of the chest, for instance, neither the stethoscopic signs, nor the respiration, nor the pulse alone, can furnish the practitioner with all the information of which he is in want; but if, knowing the exact value of each of these signs and the fallacies which attach to each, he makes use of all of them at the same time, there are few difficulties in diagnosis which he will not be able to overcome.

CHAPTER IV.

GENERAL THERAPEUTICS.

722. THE science of therapeutics, as the name implies, treats of the cure and palliation of diseases. In its widest sense, it comprises all knowledge which has an immediate bearing upon this important object—the knowledge of disease, on the one hand; and of the virtues of remedies, on the other. The application of this knowledge in individual cases constitutes the *Art* of healing. As there is a general and special pathology, so is there a general and special therapeutics. General pathology has been treated in a former chapter; general therapeutics remains to be considered in the present.

723. This subject is beset by the same difficulties which attach to the study of disease, and by others which are peculiar to itself. It has been already stated, that our knowledge of disease is rendered imperfect by our ignorance of the phenomena of health: just in the same manner our knowledge of the action of remedies in disease is impeded by the slender information which we possess on the effects of those remedies on the healthy frame. But the great obstacle to the improvement of the science and the art of healing, is the difficulty of instituting comparative trials of the efficacy of different modes of treatment in the same disease, and our necessary ignorance of the extent to which the body, if left to itself, would repair the injuries which it sustains. The medical man does not feel justified in leaving disease to itself; hence he is ignorant of the nature and power of the "vis medicatrix:" on the other hand, he is unwilling to risk the employment of a new remedy in a disease in which an old one has been used by general consent, lest an unsuccessful or fatal result should be laid to his charge.

724. When these facts are taken into consideration, it will be easy to estimate the difficulty of forming any exact classification of remedies, or establishing any broad principles of treatment. Nevertheless, it is important that the attempt should be made, as general principles are the foundation of all sound practice. The difficulties which lie in the way of such an attempt will be best removed by following step by step the principal functions of the body, as already described in a former chapter, and endeavouring to show the effect which remedies produce upon each of them in turn. In pursuance of this plan, the following arrangement will be adopted.

(1.) Remedies applicable to disorders of the primæ viæ, including the treatment of disorders of the stomach, liver, and intestines. This part corresponds with the first division of Chapter II. (§ 97 to 221.)

(2.) Remedies which affect the circulation and the functions performed by the several orders of vessels. This division corresponds with the second part of Chapter II. (§ 222 to 324.)

(3.) Remedies which act upon the structures of the body. This division corresponds with the third part of Chapter II. (§ 325 to 366.)

(4.) Remedies which act upon the nervous system. This division corresponds with the fourth part of Chapter II. (§ 367 to 455.)

(5.) Those means of preserving, improving, and restoring health, which are generally considered under the name of hygiene. This division corresponds to Chapter I. (§ 40 to 58.)

(6.) A sixth division will comprise an attempt at a classification of the more important remedies.

1. REMEDIES APPLICABLE TO DISEASES OF THE PRIMÆ VIÆ.

725. *Diet.*—Most disorders of the stomach require some regulation of the diet, or some directions as to the time and mode of taking food. The functional disorder of most frequent occurrence is anorexia, or loss of appetite, attendant upon almost all severe diseases, especially those of an inflammatory or febrile character. This loss of appetite, which is always accompanied by a loss of power to digest food indicates either entire abstinence, or the use of such articles of diet as are least irritating to the stomach. These are the farinaceous liquids, such as barley-water and gruel; acidulated drinks, such as lemonade, imperial, toast-water, and the ripe juicy fruits, especially the orange. Some small portion of nutritious matter is furnished by these articles of diet, though the stomach has lost the power of digestion.

726. Those functional disorders of the stomach which are independent of the general system, and originate within the organ itself, are termed dyspepsia, of which there are two kinds—the acute and the chronic. The acute form requires a similar diet to that which is indicated in the anorexia attendant upon constitutional diseases; a diet free from all matter which can irritate the tender membrane of the stomach, such as gruel, arrow-root, or sago, to the entire exclusion of all solid matter, whether animal or vegetable.

727. The chronic form of dyspepsia requires a close attention to the time and mode of taking food, the quantity and quality of the food itself, and the condition of the other functions of the body, especially those of the intestines. The treatment of this form of disease involves too much detail to allow of its being discussed in this place. The necessity of complete mastication, and of the use of a moderate quantity of liquid, and the mischief of over-repletion, of prolonged

abstinence, and of the excessive use of condiments, are too obvious to require much comment.

728. Organic diseases of the stomach require the same abstinence from solid and irritating matters which has been insisted upon in the treatment of acute dyspepsia. But here it is important to administer such substances as nourish, at the same time that they are free from irritating qualities; such as strong broths, soups, and jellies. When the stomach is altogether unable to retain food of the least irritating kind, and in the smallest quantities, life may be prolonged by nourishing enemata.

729. Another point to be attended to in regulating the diet of patients is, to give them such food as is suitable to their age. This caution requires to be observed more especially in the diseases of children. The stomachs of children are easily disordered by food ill-adapted to their years and strength; hence solid food of all kinds is apt to disagree with very young children; and the disorder of the stomach and bowels which it occasions gives rise to infantile remittent fever, developes the scrofulous taint, and, if unchecked, terminates in hydrocephalus or mesenteric disease. For children who suffer in any of these ways, a strict regulation of the diet, an abstinence from every kind of solid food, and, in extreme cases, a recurrence to the diet of the infant at the breast, substituting for the milk of the mother new milk from the cow, and administering it, if necessary, in small quantities, and at long intervals, is indicated. This simple treatment, together with the steady use of aperients, is often attended with the best effects. In the absence of these simple precautions, all other treatment is useless.

730. The disorders of the stomach which have been just described affect chiefly, if not entirely, the *reducing* function of the organ. When the *converting* function is disordered, the diet must be regulated according to the nature of the existing disorder. In cases of diabetes mellitus, for instance, where an unusual quantity of sugar is generated in the stomach and excreted by the kidney, it is usual to prescribe such a diet as contains the smallest quantity of substances capable of being converted into saccharine matter. The saccharine staminal principles, therefore, are given in small quantity and in an organized form, and the diet consists chiefly of albuminous and oleaginous elements. The substitution of gluten bread for common bread is also believed to be indicated in this disease. It is necessary to bear in mind, however, that all these restrictions of the diet in diabetes are dictated by a theory, the soundness of which is open to doubt, that when we are unable to attack the cause or source of the disease, it is beneficial to render difficult or impossible the development of its leading symptoms. It is at least possible that a patient suffering from diabetes may thrive as well on a diet which supplies the elements of sugar, as on one which withholds them, and that the diminution in the quantity of sugar which takes

place under the use of remedies and a restricted diet, may be but a part of the natural course of the disease itself.

731. A similar, but a less strict, attention to diet is necessary in the subjects of the oxalic diathesis, in whom it may be sufficient to prevent the use of sugar in its crystallized form.

732. A strict attention to diet is necessary not merely in disorders of the stomach, but as a means of inducing certain states of the general system. The influence which a particular diet exercises upon the health is well exemplified in the opposite systems of training practised in preparing men for the exercise of the ring and of the turf. The physician, likewise, resorts to a certain kind of diet, with a view of imparting or reducing strength: allowing a nourishing diet to the convalescent, and restricting the patient labouring under a severe inflammatory or febrile attack to substances containing little or no nutriment. This latter, which is called the *antiphlogistic* diet or regimen, must be more or less strict, according to the severity of the disease in which it is prescribed. In cases of the more severe kind, total abstinence from food may be necessary, fluids being allowed according to the existing degree of thirst: in less severe and urgent cases, the patient may be restricted to a vegetable diet, which has little effect on the circulation.

733. During the stage of convalescence from acute diseases, it is necessary to pass with caution from the abstinence of the strict antiphlogistic regimen to vegetable diet, from that to fish or light broths, and then to meat in moderate quantity, beginning with that most easy of digestion—viz., mutton. The regulation of the diet in cases of convalescence is of much importance, and requires a strict attention, on the one hand, to the powers of the stomach, as tested by the degree of appetite, and the effect of the food already prescribed, and, on the other, to the state of the circulation, as evidenced by the pulse.

734. The physician should bear in mind that vegetable food has little or no effect on the circulation, but that animal food stimulates, that warm liquids excite, whilst cold liquids act as sedatives, and that food produces its greatest effect on the circulation in the early part of the day. The knowledge of these facts should be acted on, especially in cases of slow and unsteady convalescence; that is to say, in those cases where debility is accompanied by some remains of local affection, where the appetite is variable, and that condition of the general system exists to which the name irritation has been given. On the other hand, when disease has entirely left the patient, and nothing but debility remains, when the appetite is strong and the circulation tranquil, food may be administered with less caution.

735. But there are cases in which a nourishing and even stimulating diet is necessary, though local inflammation and constitutional irritation be present. These are cases in which debilitating discharges

exist, or extensive injuries are in course of reparation, requiring a more abundant supply of nourishment than that which the stomach, if left to itself and guided by the existing appetite for food, would be able to supply. Here we must combine the stronger and more stimulating kinds of solid food with liquids containing nourishment and stimulus, as wine, ale, porter, &c. In such cases, too, the previous habits of the patient must be attended to, and the drunkard must be supplied with his accustomed stimulus. These cases fall, for the most part, under the care of the surgeon, and it is in the treatment of them that the accomplished surgeon best displays his skill.

736. One general rule applies to diet, as to the employment of every remedy of the more simple kind—viz., that where diet is equally efficacious with medicine, it should always have the preference. The duty of the physician is not to cure disease by physic, but to cure it by all the means which are within his reach, and the more simple the means, the stronger their claim upon his notice.

737. Diet forms but a part of the remedial means which we have at command in treating diseases of the stomach. For the acute affections of the mucous membrane of the stomach, indeed, diet alone will often prove a sufficient remedy, though it may occasionally be necessary to resort to leeches or blisters to the epigastrium ; but for those chronic affections which have received the name of chronic dyspepsia, something more is required. In addition to the regulation of the diet, medicines are often required for the relief or cure of these cases. Much may be done by taking off the load from a weak stomach ; but it is necessary, at the same time, to impart strength.

738. Many substances, which have the effect of increasing the appetite and the powers of the stomach, are in common use, as condiments. Of these, common salt is the only one absolutely required ; for experiment has shown that animals deprived of this simple condiment soon perish, however nourishing their food may be in other respects ; and one of the severest punishments to which man has ever been subjected, is a diet from which common salt is excluded. With this exception, the healthy stomach does not stand in absolute need of condiments, though, when the diet consists principally of vegetable food, the use of spices seems to contribute to digestion.

739. Almost every substance which possesses active properties of any kind, when taken into the stomach, produces some effect upon the mucous membrane, and by far the majority increase its vascularity, the flow of its secretion, and the contraction of its muscular coat. All the rubefacients, for instance—that is to say, all those substances which inflame the skin, inflame the mucous membrane of the stomach also ; and many substances which have not power enough to act upon the skin, through the cuticle, affect the more delicate and less protected mucous membrane of the stomach. In small doses, these substances increase the appetite and strengthen the digestion ; when long con-

tinued, they produce congestion and debility of the capillaries; and when given in large doses, they act as emetics. Thus common salt, which in moderation is the best and safest condiment we possess, when given in large doses, produces sickness, and in still larger ones, acts as an irritant poison. The same observation applies to mustard, horse-radish, garlic, &c.

740. There is reason to believe that, as far as the stomach itself is concerned, almost all substances, whether derived from the vegetable or mineral kingdom, act nearly in the same way. For instance, a quarter of a grain of arsenic, or a grain of tartar-emetic, or a scruple of sulphate of zinc, or the same dose of ipecacuanha, will not produce vomiting more effectually than a table-spoonful of mustard, or twice the quantity of common salt, or a large draught of warm water. On the other hand, a thirtieth of a grain of arsenic, or the twelfth of a grain of tartar-emetic, or one or two grains of zinc, or the same dose of ipecacuanha or squill, will as surely increase the appetite as half a tea-spoonful of salt or mustard, or a small draught of warm water. In choosing, then, between the many substances which act as emetics in large doses, and as gentle stimulants in small ones, we prefer those which produce the least injurious effect upon the constitution; and these are the substances which experience has pointed out as the best and safest condiments. A list of them would comprise all the stimulant and aromatic herbs used in cookery, as well as many substances employed in medicine. All of these under different names and variously combined, have been given either as independent remedies in dyspepsia, or to qualify remedies directed to other organs. Thus we combine mint, or ginger, or cloves, with saline purgatives, ammoniacum with squills, galbanum with aloes, the essential oils with many different kinds of aperient pills.

741. The simple bitters, and the warm aromatic bitters, or the astringent bitters, under the name of aromatics, stomachics, carminatives, or cordials, are the remedies most frequently employed with a view of increasing the appetite, or causing the muscular fibres of the stomach to contract.

742. *Emetics.*—Any of the remedies just enumerated, when given in large doses, are emetics. Those in most common use are ipecacuanha, tartar-emetic, and zinc; mustard or common salt are often of use, on an emergency, when other emetics are not at hand. It is usual to promote the action of these substances by copious draughts of warm water, and by tickling the throat with a feather. Emetics are commonly prescribed, merely with a view of emptying the stomach; occasionally they are used for this purpose in the beginning of febrile affections, and they are administered frequently, and at short intervals, with the best effect, in incipient cases of phthisis pulmonalis, and in bronchitis accompanied with profuse expectoration. They have also proved themselves the only efficient means of producing reaction in

the collapse of Asiatic cholera. Common salt, in the dose of one or two table-spoonfuls to a pint of water, has been administered in that condition with the best result.

743. The stomach becomes insensible to the effect of stimulants if they are often repeated; so that what was an emetic at first, becomes a promoter of digestion; what acted as a gentle stimulant when first administered, loses its effect entirely by repetition. Thus, a cigar, to a person unaccustomed to smoke, will cause vomiting; but, after many repetitions, it becomes an effectual promoter of digestion. The same thing occurs in disease during the administration of tartar-emetic: the first few doses will often cause sickness; but ere long the stomach becomes accustomed to its use, and, if continued, it produces that amount of stimulation which is favourable to digestion.

744. The remedies which have been mentioned probably differ but little in their mode of action on the stomach; but their remote action on other organs of the body is very various. Some of them belong to the class of stimulants, others to that of tonics, and the most active are strong irritant poisons. It is in their direct action on the stomach itself that they resemble each other, producing, according to the dose, the effect of a stomachic, a nauseant, an emetic, or an irritant poison.

745. All the medicines which have been enumerated produce, according to their dose, a determination of blood to the mucous membrane; and there are probably but few which produce permanent contraction of the capillaries. Cold liquids and ice are the most effectual remedies of this sort, and are therefore well adapted to combat severe inflammation of the stomach, or active hæmorrhage from the mucous surface. In the more chronic forms of determination of blood, and in passive hæmorrhage, nitrate of potash in full doses may be administered with advantage.

746. The muscular coat of the stomach may be stimulated to contraction most effectually by the warm aromatic bitters, as ginger, cardamoms, &c.; the neuralgic pain of the stomach (gastrodynia), is often effectually removed by bismuth, zinc, or nitrate of silver, and the troublesome sickness which sometimes attends diseases of remote organs, by dilute hydrocyanic acid.

747. *The liver.*—The functional disorders of the *liver*, which consist in a diminished secretion of bile, are most effectually treated by small doses of mercury, or by the nitro-muriatic acid. Another remedy sometimes given, with the same object of promoting the secretion of the bile, is taraxacum.

Intestinal canal.—The chief functional disorders of the intestinal canal are diarrhœa, hæmorrhage, and constipation.

748. *Diarrhœa*, like dyspepsia, may be acute or chronic. Acute and recent diarrhœa, like acute gastritis, may always be removed by

a farinaceous diet, from which all solid and irritating matters are excluded. Chronic diarrhœa, arising as it does from a congested state of the mucous membrane, may be cured most effectually by removing that congestion. This is effected by small doses of mercurial preparations, which, acting on the liver, increase the secretion of the bile, and unload the branches of the vena portæ. Where this treatment fails, which it rarely does, and probably only where the mucous membrane is in an extremely relaxed state, astringents may be resorted to, as catechu, kino, aromatic confection, chalk mixture, tannin, &c. When these fail, the stronger astringent minerals, as sulphate of zinc or sulphate of copper, in combination with opium, will sometimes prove successful. In my own experience, the nitrate of potash has succeeded where these have failed.

749. Dysenteric diarrhœa which is characterised not by profuse mucous discharges, but by scanty and teasing evacuations of a gelatinous substance, or of mucous mixed with blood, are best treated by occasional full doses of castor-oil in combination with laudanum, with small doses of some mild mercurial preparation, given two or three times a day, so as to act on the liver, and free the circulation through the portal vessels.

750. *Hæmorrhage* from the intestines (melæna) requires the same treatment as chronic diarrhœa—viz., small doses of mercurial preparations, to increase the secretion of the liver, and unload the vena portæ, combined with an unirritating diet. This treatment will be equally effectual, whether the blood come, as some suppose, from the liver itself, or from the surface of the intestines.

751. Another form of hæmorrhage from the bowels occurs in dysentery; blood is also passed from internal or external piles; and occasionally florid blood is discharged in large quantity from the open mouth of a single artery. Ipecacuanha and opium have been found eminently serviceable in dysentery. Piles are most effectually relieved by unloading the bowels, by promoting the secretion of the liver, by the local abstraction of blood, and the local application of cold. The last-named form of hæmorrhage is detected by the use of the speculum ani, and cured by the application of nitric acid to the bleeding vessel.

752. *Constipation*, as it arises from many causes, requires many remedies. The substances which naturally promote the action of the bowels are those which escape the action of the stomach, and are not convertible into nourishment; such as the green matter of vegetables, the hard covering of seeds, the tendons and gristle of meat. Where these are carefully removed in the process of cookery, constipation is apt to arise, and may often be removed by introducing some of these indigestible substances into the food. Thus, brown bread will often prove an effectual laxative. Constipation is also apt to occur in persons of sedentary habits, and to disappear under active exercise.

753. The medicines which act upon the bowels are all those that

cause vomiting when taken into the stomach, as tartar-emetic, tobacco, sulphate of zinc, ipecacuanha, squills, &c., and the whole class of irritant poisons. It is probable that all purgatives given in sufficiently large doses would act as emetics, just as all emetics given in too small doses to produce vomiting, when they pass into the bowels, act more or less energetically as purgatives. Many of those substances, however, which act as violent purgatives, have little or no effect on the stomach; hence their action may be considered as in some degree peculiar.

754. Purgatives act in two ways—by promoting the secretion of the mucous membrane, and by increasing the peristaltic action of the intestines; but some act slightly in one of these ways and energetically in the other. Those which excite abundant watery discharges are called *hydragogue cathartics*.

755. Purgatives are of various kinds, and may be divided into groups or classes; as the mild cathartics or *laxatives* (manna, cassia pulp, tamarinds, prunes, honey, bitartrate of potash, and the fixed oils, as castor, almond, and olive oils); the *saline* or antiphlogistic purgatives (sulphates of soda, potash, and magnesia); the milder acrid purgatives (senna, rhubarb, and aloes); the strong acrid purgatives (as jalap, scammony, black hellebore, gamboge, croton oil, colocynth, and elaterium); and, lastly, the mercurial purgatives (as the hydrargyrum c. cretâ, the pilula hydrargyri, and calomel).

756. We make choice of one or other of these remedies, according to the object which we have in view. If we wish simply to relieve the bowels, we prefer combinations of aloes with rhubarb, or ipecacuanha; if gently to promote the secretion of the whole course of the intestinal canal, we use the gentle laxative; if to reduce inflammation, the saline; if to overcome obstinate constipation, the stronger purgatives; if to remove dropsical effusions, the drastic or hydragogue cathartics; and if we desire to promote the secretion of the liver at the same time, we combine the mercurial purgatives with those adapted to fulfil other indications.

757. The choice of purgatives is not more important, however, than the mode of administration. When the bowels have been long overloaded with fæces, and especially where the irritation produced by them has affected the nervous centres, it is important to remove the load from the intestines without increasing the mischief already existing; in other words, hypercatharsis must be carefully avoided. Here we must not only select such remedies as effectually remove the feculent matter, but watch their operation from day to day; and as soon as any signs of intestinal irritation make their appearance, we must withdraw our purgative, and treat the hypercatharsis as if it were diarrhœa produced by any other irritating cause—viz., by a mucilaginous diet.

758 In cases of extreme irritability of the stomach or bowels, or

of both, we may relieve the intestines by enemata, consisting of warm water, or gruel with or without an admixture of common salt; or we may employ any of those remedies which act as purgatives, however introduced into the system. Of these, the most effectual is croton oil combined with castor oil, and rubbed into the skin. The shock of cold water on the surface of the abdomen, or the electric spark, will also produce a purgative effect; the former is often employed with advantage in cases of obstinate constipation.

2. MEDICINES WHICH ACT ON THE ORGANS OF CIRCULATION.

759. We recognise three distinct states of circulation in healthy persons, in disease, and under the operation of medicines—viz., 1. Increased frequency of pulse with increased force and fulness; 2. Increased frequency of pulse with diminished force and fulness; 3. Diminished frequency of pulse with increased or diminished force and fulness.

760. In health, the first state of circulation is brought about by violent exercise, by spirituous liquors, &c.; the second may be produced by those strong mental emotions and impressions which, in excess, give rise to syncope; the third attends exhaustion and sleep.

761. In disease, the first state of circulation is present in acute inflammation or high inflammatory fever; the second, in all diseases attended with extreme debility; and the third, in some cases of hysteria in females, and in some cases and certain stages of apoplexy.

762. The same conditions follow the operation of remedies; the frequent, full, and strong pulse is produced by spirituous liquors, ammonia, &c.; the frequent, small, and weak pulse by tartar-emetic, tobacco, &c.; and the infrequent pulse, of varying size and force, by opium, digitalis, conium, stramonium, &c.

763. In the cases specified—that is to say, in health, in disease, and under the operation of remedies, supposing the several states to be produced in the same person, with the same quantity of circulating fluid in his body, it is obvious that in a given time more blood will traverse each organ in the first case, a less quantity in the second case, and a variable quantity, sometimes more, sometimes less, in the third case.

764. According to the first supposition, the quantity of blood traversing each organ is increased in two ways;—by the increased frequency of the heart's beat, and the increased quantity of blood sent out at each contraction of the ventricle; according to the second supposition, the quantity of blood passing through each organ is diminished, because the quantity of blood sent out from the heart is lessened more than the number of beats is increased; and, according to the third supposition, the heart sends out in one case more, in

another less, blood than that which will compensate for the diminished number of its beats.

765. The remedies which augment the frequency as well as the force of the heart's contractions are called *stimulants*; those which augment their frequency and diminish their force are called *depressants*; those which produce diminished frequency belong to the class of *narcotics* and *sedatives*.

766. *Stimulants* (*incitants* or *excitants*).—According to the definition just given, the state of the circulation is made the test and measure of the effect of remedies; those remedies being stimulants which increase the frequency, as well as the force, of the heart's contractions. In assuming this as the test, it is not meant to apply it without any exception, for it will soon appear that there are cases in which stimulants diminish instead of increasing the number of the heart's contractions. Nevertheless, this is their invariable effect on healthy and vigorous persons, and their more common effect in disease.

767. This state of circulation is brought about by the agency of the nervous system, whatever may be the part to which the stimulant is applied; and this change thus produced in the condition of the nervous centres is reflected back upon the heart and organs of circulation. If, for instance, a stimulant, such as brandy, be taken into the stomach, the impression produced upon its nerves is conveyed, either directly to the heart through the branches of the solar plexus, or to the brain and spinal cord, whence it is reflected upon the heart; or being absorbed into the circulation, it may be applied directly to the nervous centres, or to the nerves supplying the lining membrane of the heart itself. Here there are many possible ways in which the circulation may be affected; but a more simple case is that of exercise, the most powerful stimulant of the healthy frame. It may easily be proved that the effect of exercise on the circulation is not merely a mechanical one, but that it arises, at least in part, from the reflection of nervous influence upon the heart in common with the voluntary muscles of the body. The effect of heat applied to the skin is evidently due to the same cause. Hence it may be safely stated, that though the state of the circulation is the test of the action of stimulants, it is through the nervous system that that state is brought about.

768. The effects of stimulants on the healthy body may be partly explained by the increased quantity of blood sent to every organ of the frame. The rapid and abundant circulation through the lungs leads to a more frequent respiration, and a more complete decarbonization of the blood; the increased flow of arterial blood to the brain excites all its functions; the impressions on the senses are more acute, the flow of ideas more rapid, volition stronger and more prompt, the passions excited, the feelings joyous; all the capillaries of the

body are distended, and the glandular structures pour forth their secretions; the involuntary muscles, too, partake of the general excitement; and the functions dependent upon them, as digestion, defæcation, &c., are performed with increased vigour.

769. Such are the effects of stimuli given in moderate quantity; in excess they act as depressants or narcotics. Thus spirituous liquors, when taken in moderation, produce all the effects which have been described; but in large doses they may give rise either to sickness, accompanied by depression or collapse, or to narcotism. In the one case, they occasion vomiting, a feeling of extreme debility, a frequent and small pulse, a cold sweat; in the other, they produce symptoms of apoplexy, oppression of all the functions, paralysis of the voluntary muscles, and an infrequent beat of the heart. The first effect is commonly produced in persons unused to the action of the stimulant, in whom the stomach, retaining its healthy sensibility to poison, rejects it when taken in large quantity; the latter, in those whose stomachs are naturally insensible, or have become so by long habit.

770. As the narcotic effects thus produced are similar to those brought on by opium, or by other substances belonging to the class of narcotics, alcohol has been put down in the list of narcotic remedies; but without sufficient reason, for narcotism is the necessary effect of extreme exhaustion of the nervous power, and exhaustion the invariable consequence of over-stimulation. It would be as reasonable to call exercise a narcotic, because the exhaustion which it produces, when carried to excess, occasions deep sleep. Alcohol has all the attributes of a pure stimulant, differing from other stimulants in degree more than in kind, and belonging to the class of volatile or diffusible stimulants. If alcohol is to be placed among the narcotics, because it may produce coma, it must be classed with the emetics and depressants, because it occasions sickness and debility. It may be laid down, then, as a general rule, that all stimuli carried to excess produce exhaustion of the nervous power, and that this exhaustion may display itself in one of two ways—in depression or oppression; in debility or coma.

771. It has been stated that increased frequency, fulness, and force of pulse is the test of the action of stimulants, but that there is one case in which the test does not apply. This case has already been indicated (§ 766). It is the case of debility without local disease, and accompanied with frequent pulse: in this state stimulants diminish the frequency of the pulse. It has also been stated elsewhere (§419), that the effect of stimulants on a pulse rendered infrequent by debility without local disease, is much less than that produced on the pulse of healthy persons. This fact is easily explained, by the exhaustion of the nervous system which attends debility, and renders it dead to all impressions from within or from without. In adminis-

tering stimulants in this state of debility, their effect on the circulation should be carefully noted. If they lower the pulse, they act favourably; if they raise it much, they do harm. It is when they lower the pulse that stimulants act as tonics: when they raise it much, they impart merely momentary strength, to be followed by collapse proportioned to the previous excitement.

772. As the question whether we shall or shall not administer stimulants in certain diseased conditions is one of extreme importance, it may be well to enter a little more minutely both into the signs which indicate the expediency or necessity of resorting to them, and into those which serve to prove that we were justified in administering them. The conditions of system which especially demand the exhibition of stimulants are, 1. The fainting state. 2. The permanent state of exhaustion brought on by loss of blood, the long continuance of profuse discharges, prolonged abstinence from food, the use of an innutritious diet, and mental or bodily fatigue. 3. The state of exhaustion which supervenes in the course of febrile disorders, which assume the typhoid or adynamic type: and 4. The state of exhaustion that ushers in many severe diseases.

(1.) The fainting state in whatever way it may be brought about, whether by sudden loss of blood, by violent or prolonged exertion, by exposure to a heated and impure atmosphere, by intense mental emotion, by the temporary cessation of the heart's action in organic diseases of that organ, or by the operation of large doses of certain poisons, as Prussic acid, and the vapour of ether and chloroform, demands the same treatment; namely, the shock of cold water proportioned to the urgency of the case, and the diffusible stimulants, ammonia, ether, and alcohol in the form of the stronger spirits.

(2.) The permanent state of exhaustion brought on by loss of blood, by the long continuance of profuse discharges, or by any of the several causes just specified—a state indicated by extreme pallor of the countenance and skin; small, quick, and frequent, or small, frequent, and irregular pulse; hurried respiration, with frequent sighing; great nervous irritability; and, in some cases, delirium—demands the continued and persevering use of those less diffusible stimulants which combine alcohol in variable proportion with a certain quantity of nourishment, such as porter, ale, wine, and brandy. The quantity, strength, and repetition of the stimulant will have to be carefully proportioned to the degree of exhaustion. It will generally be expedient to combine a narcotic with the stimulant, in which case opium or laudanum is obviously indicated.

(3.) That state of exhaustion which supervenes in the course of febrile disorders assuming the typhoid or adynamic type (to which class belong typhus fever itself, many cases of the febrile exanthemata, measles, scarlatina, small-pox, and erysipelas, the remittent fever of children, puerperal fever, pneumonia, and the irritative fever following severe surgical injuries), also requires the use of stimulants. The extreme degree of this state of exhaustion is so well marked by the position on the back, the sinking of the body towards the foot of the bed, the picking of the bed-clothes, the low muttering delirium, and the involuntary discharges, that there can be no difficulty in deciding that stimulants are necessary; but long anterior to this stage of extreme exhaustion and collapse stimulants may often be given with the greatest advantage. Nevertheless the symptoms may at that earlier period be such as to excite a doubt of the propriety of administering these remedies: the skin may be hot and dry, the tongue covered with a dark dry fur, the breathing quickened, the pulse frequent and sharp with some degree of fulness, the countenance dusky, the vessels of the eye injected with dark blood, the patient restless and delirious, his movements indicating a certain amount of muscular strength. In this state of things it may become a grave practical question whether stimulants ought or ought not to be given, and our doubts can only be decided by actual experiment, and careful observation of the patient before and after the use of the stimulant. The best mode of procedure is first to examine and count the pulse prior to the use of the stimulant: then having caused the patient to swallow a glass of wine, to examine and count the pulse afresh. If it should become more frequent, and increase in hardness and sharpness, the stimulus is unsuitable. If, on the other hand, the pulse falls and becomes decidedly slower and softer, we were justified in the use of the stimulant, and may safely prescribe its cautious repetition. If after an interval of a few hours, during which we have persevered in the use of stimulants, we find the pulse less frequent, slower, and softer, the tongue becoming moist, the skin cooler, and moistened with perspiration, the breathing deeper and slower, the countenance less dusky, the eye more clear, and the restlessness and delirium abated, we have every reason to persevere in the course of treatment on which we have entered. A sign much insisted on by Dr. Stokes, as decisive of the necessity for stimulants, is the condition of the heart. As this organ partakes of the weakness which affects the entire muscular system, its pulsations become extremely feeble, and the first sound almost imperceptible. The beneficial operation of stimulants is therefore indicated by increased force of impulse, and renewed distinctness of sound. As the one condition of the heart indicates the necessity for stimuli, so does the other justify the use of them. Where, then, the pulse itself does not furnish satisfactory indications, the ear or the stethoscope applied to the region of the heart may assist us in our decision.

(4.) That state of exhaustion which commonly supervenes in the advanced stages of typhus fever, and in other diseases which have put on the typhoid type, is sometimes present in the early stages of the same maladies. The effect on the system of the poison of the several infectious and contagious disorders is sometimes nearly allied to a state of collapse. The patient is extremely weak, and subject to faint on the slightest exertion, the countenance is pale, the surface cold, the pulse frequent, full, quick, and extremely compressible, and the respiration hurried. In this state also it may be a question whether stimulants ought to be employed, and as in the former instance, actual experiment alone can decide the question. If the effect of the stimulant be to lower the pulse and render the breathing less frequent, we are justified in prescribing its repetition, taking care, at the same time, to be on the watch for the reaction which in many cases follows this state of depression.

773. *Tonics.*—These remedies, as the name implies, are given in states of debility, with a view of restoring firmness, strength, and *tone* to the entire frame. When the body is extremely weak, stimulants have the effect of imparting real strength; in other words, they become tonics. In less degrees of debility, they produce less obvious effect than on the robust and healthy. Stimulants in large doses become tonics in small ones; is there not, therefore, good reason to suppose, that those remedies which are tonics in the dose in which they are commonly employed, would act as stimulants in larger quantities? Ought not stimulants and tonics to be classed together, as remedies which have the same effect on the system, but vary rather in the state of body in which they are administered, stimulants being tonics for the weak, and tonics becoming stimulants to the strong?

774. *Depressants.*—This name is here used to distinguish a class of remedies which has the effect of rendering the pulse frequent, small, and weak—the exact reverse, therefore, of the action of stimulants. This change in the circulation is accompanied by great prostration of strength, nausea, cold sweat, and all those symptoms which characterize approaching syncope. It is brought about by the abstraction of blood, by the preparations of antimony, and by many remedies which act as stomachics in small doses, and as emetics in large ones.

775. The loss of a large quantity of blood, or the rapid removal of a smaller quantity, brings about syncope, or a state approaching to it; and as during this state the heart sends out a comparatively small quantity of blood, and that which it does send forth is propelled with little force, that part of inflammation which consists of an increased action of the heart is removed by the abstraction of blood.

776. Tartar-emetic, which, next to bleeding, is our sheet-anchor in acute inflammation, and one of the most powerful and safe remedies in the materia medica, brings about precisely the same condition as that produced by bleeding, and may be employed either alone or in combination with bloodletting in the treatment of all *acute* inflammations. Tartar-emetic is the only depressant of acknowledged power and efficacy which acts simply as a depressant; for tobacco, which produces a very similar effect, in some respects, combines the properties of a narcotic and a depressant, and the same observation applies to another powerful depressing agent, the lobelia inflata.

777. As there is an exception to the rule that stimulants increase the frequency and force of the pulse, so is there an exception to the rule that depressants increase its frequency while they diminish its force. Thus, bloodletting, which belongs to the order of depressants, will render the pulse full and strong, and even increase its frequency, in certain cases of plethora, when the circulation is oppressed with blood, and in pneumonia, when the powers of the system are oppressed and the circulation impeded by obstruction to the important function of respiration. Again, in cases of acute inflammation, accompanied with high inflammatory fever, bleeding or tartar-emetic will lessen the frequency and force of the pulse at the same time. In all these cases, however, the modus operandi of these remedies is essentially the same; it appears to be different merely because the circumstances in which the remedies are employed vary. Bleeding is not a stimulant because it sometimes gives force and frequency to the pulse, any more than alcohol is a depressant because it sometimes renders the pulse small and frequent. The ordinary effect of remedies on persons in health ought to determine the class to which they shall be referred.

778. *Sedatives.*—These remedies may be considered in this place, because they are nearly allied, in some respects, to the last class, and are by many authors confounded with them. Like stimulants and depressants, they act upon the nervous centres originally, though some of their more obvious effects display themselves in the circulation.

779. Sedatives differ from stimulants and depressants, inasmuch as they do not increase the frequency of the pulse, but, on the contrary, diminish it. They resemble narcotics in reducing the frequency of the pulse, but differ from them in not producing stupor. The true sedatives sometimes produce sleep, but they as frequently occasion wakefulness; they differ from the pure narcotics inasmuch as in large doses they cause delirium, or a state nearly resembling delirium tremens, whilst the narcotics in large doses occasion coma and apoplexy.*

780. Hydrocyanic acid and digitalis are the principal remedies of this class, to which may be added the powerful remedy of cold. Hydrocyanic acid and digitalis both lower the pulse, although neither of them bears any resemblance, in other respects, to narcotics. It is true that there are states of system in which both these remedies will increase the frequency of the pulse, just as there are states of system in which the effect of stimulants and depressants on the circulation is reversed. Digitalis, for example, which, administered in diseases accompanied with a frequent pulse, lowers it in a remarkable degree, and often reduces it much below the healthy standard, in some healthy persons, and perhaps in all, has the reverse effect.† The effects of

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* See some of the distinctions insisted upon in this place clearly laid down in Dr. Billing's "First Principles of Medicine."

† See the Experiments made by Dr. Saunders on his own person, and detailed in his work on Consumption.

hydrocyanic acid are more constant; but there is little doubt that exceptions exist to the rule of its operation. In classing cold with sedatives, the same difficulty exists, for extreme cold produces effects which give it as good a title to be placed among the narcotics. This remedy is so important that it deserves a separate consideration.

781. *Cold*, according to the degree and manner of its application, acts in very different ways. Its general effects on the circulation depend upon its intensity. A moderate degree of cold applied to the general surface acts as a stimulant; but when the skin is hot and dry, it reduces the temperature, lowers the circulation, soothes the nervous system, and disposes to sleep. Applied to the head in the form of cold lotion or of ice, it is one of the most valuable remedies in inflammatory affections of the brain. Its application to other parts of the body is of the greatest service in local inflammation or hæmorrhage. Cold is applied to the throat internally or externally in scarlatina anginosa, and ice may be swallowed in hydrophobia, with great relief to the symptoms. The effect of this powerful agent on the nervous system will be considered in another place. Applied locally in the form of *douche*, it restores the contractility of the capillary vessels, and, by preventing further effusion, allows the absorbent vessels to remove any fluid which may have been thrown out.

782. *Narcotics.*—The action of these remedies belongs so completely to the fourth head (the action of remedies on the nervous system) that nothing need be said in this place, except that the effect of narcotics on the circulating system is the opposite of that produced by stimulants and depressants—viz., that of diminishing the frequency of the heart's contractions. These remedies also affect the respirations in a striking manner, diminishing their number in a still greater degree than that of the pulse. This combined decrease of the pulse and respiration may serve to distinguish the action of this class of remedies; for all those remedies which produce great debility, as the depressants, for instance, increase the number of the respirations, though in certain cases they diminish that of the pulse. The double effect of narcotics on the pulse and respiration, therefore, deserves attention.

783. The remedies which have been examined affect the circulation primarily by the influence which they exert upon the nervous centres; and secondarily, through the reflection of that influence upon the heart. It remains to speak of the means which we have of effecting changes in the smaller arteries and capillary vessels.

784. *Remedies which affect the small vessels:* Treatment of inflammation.—It has been already stated that in inflammation there is diminished action (that is, diminished contractility) of the small arteries, with increased action of the heart, and that the two, together, keep up that dilated condition of the small vessels which is the essence of inflammation. It is obvious that there are two ways in which these minute

vessels may be restored to their healthy degree of contraction; the first is by lessening the quantity of blood which passes through them; and the second, by increasing their contractility. In most acute inflammations, both these remedies are required. If the inflammation be recent, the small vessels may recover themselves if once relieved from the undue quantity of blood sent to them by the heart; and in this case the abstraction of blood, or the use of depressing remedies, will suffice; but if the inflammation be chronic, the small vessels may have so lost their contractility, as not to recover themselves, though the blood circulates through them in diminished quantity; and in this case we must make use of such remedies as restore the lost contractility of the vessels; and precisely the same treatment is required in that state to which we give the name of congestion.

785. The treatment of inflammation then is twofold—it consists in diminishing the quantity of blood sent out by the heart on the one hand, and in restoring the lost contractility of the small vessels on the other. The first indication can be fulfilled only by general remedies, the second by general or by local means.

786. As the increased action of the heart occurs only in the *acute* form of inflammation, it is in that form alone that general remedies are necessary. These remedies are, general bloodletting and depressants, of which the best is tartar-emetic. Take, for example, an acute case of pleurisy, occurring in a robust man, or in one previously enjoying good health, the treatment is very simple—bleeding to the approach of fainting, or the complete cessation of pain, followed, without loss of time, by tartar-emetic, in such doses and at such intervals as to keep up a constant state of nausea.

787. This is the way to save blood, and to avoid chronic disease. Bleeding alone, even though often repeated, will not suffice to subdue the inflammation, for each bleeding is followed by reaction, and that reaction re-establishes the inflammation.

788. The great principle to be observed in the treatment of all acute inflammation is to subdue it at once, and not allow reaction. If this principle is not strictly adhered to, chronic disease will be the consequence. M. Louis has taught us a useful lesson as to the inefficacy of mere bleeding in one disease (pneumonia). He found—as every man who knows anything of the treatment of disease would expect—that bleeding—mere bleeding—shortened the duration of the disease only by one day. Of course it did. How was any other result to be expected? The word *reaction* explains it all. We must never, then, allow reaction. We must subdue inflammation at once, and keep it down till the small vessels have had time to contract to their usual size. If tartar-emetic should fail to subdue the inflammation after one bleeding, which it may possibly do in very plethoric persons, another bleeding must be resorted to, for it is always better to risk temporary debility than chronic disease.

789. In the abstraction of blood, one rule should always be borne in mind—to spare the lancet where we can, but to use it boldly where other means fail us.

790. Such is the treatment of acute inflammation where it is accompanied by strong action of the heart. But this is not present in all cases of inflammation. It is absent in inflammation of the mucous membranes, unless they take on the most acute character, as in croup, or in cases of irritant poisoning; it is absent also in erysipelas, and in many cases of inflammation occurring in persons of a broken constitution. The chief inflammatory diseases which affect the general circulation are those of the serous membranes, acute rheumatism, and extensive inflammation of the cellular membrane, the consequence of injury.

791. When inflammation of the mucous membranes, however, occurs in its most severe form, general depletion is necessary especially if the affected membrane line some narrow passage, which is apt to be filled with the secretion poured out from its surface. Thus we bleed in croup, partly on account of the existing inflammation, and partly because the narrow passages of the larynx and bronchia are apt to be filled up by the tenacious secretion poured out from the surface of the membrane. In pneumonia, too, we use the lancet freely, for a similar reason; not merely to subdue the inflammation, but to prevent the functions of the lungs being entirely suspended by the arrest of the blood in the air-cells.

792. There is another case in which we are obliged to employ general remedies, though the existing inflammation does not materially affect the circulation or threaten life—viz., when the part affected by the inflammation is an organ of such extreme delicacy that the continuance of inflammation in it would destroy its functions. This is the case in inflammation of the internal parts of the eye, when the most active measures are necessary to save the organ from destruction.

793. As a general rule, then, it may be stated, that bloodletting is required when inflammation is accompanied with increased action of the heart, or when some function essential to life is impeded, or some delicate organ threatened with destruction. In most other cases, general bleeding will be unnecessary.

794. The second indication—that of causing the dilated small vessels to contract on their contents—may be accomplished in various ways; locally, by pressure, cold, astringent applications, and the cautious use of substances which themselves cause inflammation, but act as gentle stimulants when applied in small quantity, and for a short period; and generally, by remedies which experience has shown to possess that property.

795. If the vessels are much distended with blood, local depletion is indicated as a preparatory measure. When the small vessels have

been by this means partially emptied of their contents, we may apply the remedies just mentioned according to the nature of the inflamed part. Pressure, properly applied, lends support to the vessels, and gives them time to contract; cold acts on all the textures of the part, on the vessels as well as on the nerves which supply them; astringent applications cause all the textures to contract, at the same time that they gently irritate the vessels, and excite them to the performance of their proper function; whilst the direct irritants, as nitrate of silver, and the sulphate of zinc and copper, prove beneficial simply by their stimulating property.

796. All these applications have been used with advantage—pressure, in chronic inflammation and ulceration of the extremities, and in swelled testicle; cold, in every form of external and internal inflammation, as in common phlegmonous inflammation of the skin, in the inflammatory sore throat of scarlatina maligna, in the inflammation of the fauces attending hydrophobia, in inflammatory diseases of the rectum and vagina; astringents, in common or specific inflammation of the mucous membranes; stimulants, in phlegmonous inflammation of the skin, to the surface of irritable ulcers, and to the mucous membranes in the form of injection.

797. The general remedies which promote the contraction of the capillaries (that is to say, remedies which act through the system and not by local application), are the metals, especially tartar-emetic, mercury, and arsenic, which, like iodine, act on the capillaries of every part of the body; and certain local remedies which affect particular organs, as uva ursi, copaiba, cubebs, pepper, cantharides, and turpentine.

798. The first class of remedies (tartar-emetic, mercury, arsenic, and iodine), when applied to the skin, excite inflammation; this shows the power which they exercise over the capillaries: they are also capable of being absorbed and taken into the circulation, and consequently they are applied to the capillaries in the most direct manner. Hence, when administered internally, they may be presumed to have the same power of curing inflammation which nitrate of silver has when locally applied.

799. The cases in which one of these remedies is more applicable than another are found out empirically. Tartar-emetic is to be preferred in common inflammation, mercury and iodine in specific inflammation. Mercury has the preference over all other remedies in cases of great urgency, when no time is to be lost, and our object, is not merely to subdue the existing inflammation, but to suspend specific disease, of which it is a part. Hence the use of mercury in iritis and croup.

800. Uva ursi, copaiba, cubebs, and black pepper, are all employed with great advantage in inflammation of the mucous membrane of the urinary passages. They act as direct stimulants through the urine,

and when given in sufficient doses, cure gonorrhœa, even in its acute stage. Uva ursi is used chiefly in inflammation of the mucous membrane of the bladder; copaiba and cubebs in gonorrhœa, in which disease pepper has been employed by Dr. Billing with equal advantage. Copaiba has also been advantageously employed in cases of bronchitis.

801. *Hæmorrhage* differs little from inflammation in the treatment which it requires. Active hæmorrhage demands the same remedies as acute inflammation, and passive hæmorrhage may be cured by the same means which are found useful in some forms of chronic inflammation—viz., astringent remedies, such as cold, the preparations of lead, and the several medicines which contain tannin as their active principle.

802. The treatment of *febrile affections* is governed by the same general principles which preside over the treatment of inflammation. When they are free from the complication of local disease, and are attended by a frequent, full, and hard pulse, depressing remedies, as bleeding and tartar-emetic, separate or combined, are indicated: but in those cases, where there is great prostration of strength, with a small and frequent pulse, tonics or stimulants, according to the degree of the existing debility, will be required. Local disease must be treated by general or local remedies, according to the powers of the system, with the general precaution that the strength of the patient must be husbanded as much as possible, in order that he may not be worn out before the disease has run its appointed course. The same remark applies with equal force to those febrile affections of which local inflammations form a constituent part, as the febrile exanthemata, measles, scarlatina, small-pox, and erysipelas.

803. The process of *secretion* is one over which medicine exerts much power either directly or indirectly. The most important secretions are those of the lungs, skin, and kidneys. The aerial secretions of the lungs not being subjects of observation or measurement at the bedside, yield in point of importance to the two latter.

804. The nature of the process of secretion, and of the influence which remedies have upon it, will be best understood by selecting the secretion of the skin as an example. When the skin is red, hot, and dry, we can excite perspiration by the cautious application of cold; when it is pale, cold, and dry, by the application of heat. In the one case we diminish the size of the capillaries, and consequently the quantity of blood which they contain; in the latter, we increase both. In the same conditions of skin, and in the same states of the system, we can produce the same results by depressants, on the one hand, and by stimulants, on the other. It appears, then, that in the case of this important secretion, we can produce the same effect by a local application and by a remedy internally administered. In these cases of local application, the temperature of the skin which is favourable to sweating is intermediate between the two opposite conditions, accom-

panied by the dry skin. So also, in the case of the general remedies, the temperature of the skin is brought to the same intermediate condition by the depressants, on the one hand, and by the stimulants, on the other. This state of the skin might be termed the "sweating point."

805. It is true that this point is not fixed, for it must vary in different persons, not only with the temperature of the skin and the quantity of blood circulating through the capillaries, but with the condition of the capillaries themselves; so that in strong and robust persons it must be, so to speak, much higher than in those worn out by disease; while in extreme debility it is well known that cold sweats take place from mere relaxation of the capillary vessels, when the temperature of the body is extremely low.

806. It appears, then, that increased secretion from the skin may be brought about by remedies which act upon the general circulation, and this fact may be extended by analogy to other secretions also: Thus, bloodletting, practised in a case of inflammatory fever, will promote the flow of all the secretions, by bringing the capillaries of all the organs to what may be termed their secreting point.

807. In this place it is necessary to enter a protest against the anxiety often entertained by the practitioner to obtain diaphoresis. Sweating is, no doubt, a good sign, and a useful thing whenever the skin is hot and dry; but as in the administration of so-called diaphoretics, the sweating is the necessary consequence of the change which has been effected in the general circulation, our anxiety should be, not to procure diaphoresis, but to bring the circulation into that state in which sweating is possible. Now this is not a mere splitting of straws, for by placing ourselves in the proper point of view, we are able to make a right selection of our diaphoretic. Thus, when the skin is hot and dry, we select a depressant, when cold, a stimulant diaphoretic. So also, with diuretics, we select a stimulating diuretic in languid states of the circulation, and a depressing one where there is strong febrile action.

808. It is not meant to assert that all remedies which promote secretion act only through their influence on the general circulation, for the strong analogy which may be drawn from the local action of remedies on the capillaries in inflammation must admit of application to other states of those vessels; and as it is probable that secretion does not depend upon the mere size of the vessels and the quantity of blood circulating through them, but also on the condition of their coats, there is good ground for believing that some remedies act directly upon the capillaries themselves. The virtue of tartar-emetic may, perhaps, depend on the effect which it produces on the capillaries themselves, as well as on the general circulation, although in the majority of cases the latter explanation appears sufficient.

809. There is, indeed, one case in which, the action of remedies in

promoting secretion appears to depend almost exclusively upon the adaptation of the remedy to the quality of the secretion itself. For instance, the urine is a secretion which abounds in salts, and it is well known that saline medicines are of great efficacy in promoting that secretion: the perspiration, too, contains salts, though in less quantity; this secretion, therefore, like the urine, may, perhaps, be increased by the use of remedies of which salines form a part. Thus, Dover's powder may possibly derive part of its efficacy from the sulphate of potash which it contains.

810. Admitting, then, that the secretions may be promoted both by general remedies and by remedies acting locally on the capillaries of the secreting organ, it is important to distinguish the two cases, and to bear in mind that in disease affecting the general system, it is not so much our object to promote the flow of the secretions as to bring about that state of the circulation in which secretion takes place as a necessary consequence.

811. The remedies adapted to promote the *absorption* of fluids thrown out into the several cavities of the body, act for the most part through the general system. Of these the most powerful remedy is bloodletting, which acts by diminishing the quantity of the circulating fluid, and when the cause of dropsy is of an inflammatory nature, by removing the inflammation. The other remedies in common use are employed with the same views. They consist of medicines directed to the several secreting organs, especially the bowels, kidney, and skin. The increased secretion from these parts has the twofold effect of bloodletting—that of diminishing the quantity of the circulating fluid and of subduing any inflammation which may exist.

812. Where much general debility is present, it may be necessary to combine tonics or stimulants (for stimulants are tonics to the debilitated) with depletion. To proportion the one to the other, much judgment and care are necessary.

813. The local means best adapted to promote absorption, are those which stimulate the capillaries and parts affected, as friction with the hand or with stimulating liniments, a jet of cold water, the electric spark, tincture of iodine, &c. It is of little consequence to inquire whether these agents act by restoring the capillaries to their healthy state, or by stimulating the absorbents. (See § 309.)

3. REMEDIES ADAPTED TO THE REMOVAL OF THE SOLID STRUCTURES OF THE BODY.

814. Morbid growths have been divided (see § 341) into analogous and heterologous. Experience shows that we have little or no power over the latter class; they form one of the opprobria of medicine, and where they cannot be removed by the knife, we can do nothing more than alleviate the sufferings which they occasion. The same observa-

tion extends to such analogous formations as do not consist in a mere hypertrophy of a natural texture.

815. Atrophy and hypertrophy, indeed, seem to be the only alterations of the solid structures of the body which are at all under the control of medicine. The remedies applicable to the restoration of a part from the condition of atrophy are, exercise, friction, electricity, and, in short, all those means which increase the flow of blood to the part and promote its natural actions. The remedies, on the other hand, which are of use in hypertrophy are, rest, pressure, cold, local abstraction of blood, and preparations of mercury and iodine.

816. The rationale of the action of the first-named remedies is obvious, but there is some difficulty in explaining the efficacy of mercury and iodine in promoting the absorption of solid textures. Are the capillaries contracted by these medicines so as to diminish the quantity of blood circulated through the part, and to a degree which is incompatible with secretion?—or are the absorbents stimulated to increased activity? The former supposition appears the more probable, and is more in conformity with what we know of the functions of the capillary vessels. The question, however, is of no immediate practical importance.

4. REMEDIES WHICH ACT UPON THE NERVOUS SYSTEM.

817. As all the functions of the body are more or less dependent upon the nervous influence, it follows that all remedies possessed of active properties must affect the nervous system. All the medicines, therefore, which have already been mentioned under preceding sections belong with equal right to this. Stimulants, depressants, sedatives, narcotics, and tonics, affect the circulation through their action on the nerves; and even those remedies of which the action is strictly local act locally on the nerves, and, through them, on the vessels to which they are distributed. But there are some substances which exert so peculiar an influence on the nervous system as to demand a separate notice in this place.

818. The remedies which act upon the *nerves of sensation* are classed by the toxicologist with narcotic or narcotico-acrid substances, but in works on materia medica they are considered as sedatives. Of these, monkshood and black hellebore, and their active principle, aconite, are the chief. They produce numbness, accompanied by a tingling sensation in the parts to which they are applied. Hydrocyanic acid also produces numbness of the part to which it is applied. Belladonna, too, acts locally on the nerves of sensation, and hence its efficacy in neuralgia. Its efficacy in dilating the pupil is perhaps due to its effect on the retina. But the best and most powerful local sedative is cold. It is more sure and manageable than any other, and, with proper precautions, may be applied whenever such remedies are indicated.

819. The *nerves of voluntary motion*, and through them the muscular system, are powerfully affected by remedies in three different ways; with paralysis, convulsions, and tonic spasms.

820. Extreme debility of the muscles is the familiar effect of all depressing remedies, and especially of tobacco. The same effect is produced by digitalis, and by hydrocyanic acid. Paralysis is produced by various poisons, as the woorara, ticunas, and curare, by large doses of conium and stramonium, and by one metallic poison—lead.

821. Convulsions are produced by almost all the narcotico-acrid and irritant poisons; and they follow poisoning by hydrocyanic acid, digitalis, squills, monkshood, black hellebore, conium, tobacco, stramonium, oxalic acid, &c., and occasionally occur in the course of poisoning with opium; they are also present in poisoning with arsenic, bismuth, copper, mercury, silver, and zinc.

822. Tetanic spasms are produced by nux vomica, by St. Ignatius' bean, by angustura, upas tieuté, and the active principles strychnia and brucia. They are an occasional effect of monkshood, and of the ergot of rye, taken in poisonous doses. They are also sometimes present in cases of poisoning by the more active irritants.

823. The muscular contractions of the uterus produced by the secale cornutum furnish an example of local action on the muscular fibres, of which much advantage is taken in the practice of midwifery.

824. The treatment of diseases dependent upon, or accompanied by, local affections with reflex action of the muscles, is of much importance, and in this respect the theory of the excito-motory system is likely to confer great practical benefits on medical treatment. The importance of attending to the local affections in tetanus and hydrophobia, for instance, can scarcely be overrated. In the latter disease, ice has been, in more than one instance, swallowed and applied externally to the throat with great relief to the symptoms.

825. The medicines which act upon the brain, and affect the peculiar functions of that organ, occasioning sleep, insensibility, coma, delirium, and erroneous perceptions, judgments, and volitions, are of great importance in the treatment of disease. The mode of action of the most important class, the narcotics, has already been examined (§ 782). It will be sufficient in this place to mention some of the more striking effects of the principal remedies in common use.

826. The class of inebriating substances, such as alcohol and spirituous liquors, ether, chloroform, the nitrous oxide gas, and the resin of the Indian hemp, lately introduced to the notice of the profession by Dr. O'Shaughnessy, produce the effects of stimulants in small doses, the familiar phenomena of inebriation in larger ones, followed by sleep, stupefaction, or apoplexy: when long continued, or often repeated, they produce delirium tremens.

827. The *narcotics*, of which the principal are opium (morphia),

henbane, and lactucarium, are employed to relieve pain, when they are called *anodynes;* or to soothe irritation, when they are termed *paregorics;* or to diminish inordinate muscular contraction, in which case they are called *antispasmodics;* or, lastly, to procure sleep, when they receive the name of *hypnotics.* Opium combines a stimulant with a narcotic principle; hence it is admirably adapted to the state of irritation, accompanied by much debility, the narcotic soothing the excitement, while the stimulant principle counteracts the existing debility. Sulphuretted hydrogen, carbonic acid, carbonic oxide, and cyanogen gas, act also as narcotics. As such, carbonic acid has been locally applied.

828. The class of *sedatives* comprises many substances allied in some of their properties to the narcotics, and in others to the depressants. They differ from the narcotics in not producing sleep, but, on the contrary, delirium, in some of its many forms. Thus, belladonna, stramonium, monkshood, black hellebore, veratria, colchicum, and camphor, to which perhaps musk and valerian may be added, give rise to delirium in the first instance, which is sometimes followed, after a considerable interval, by coma. Tobacco, ipecacuanha, conium, squills, and digitalis, appear to produce coma without previous delirium. Tobacco, ipecacuanha, and squills, and the lobelia inflata, have been already described as depressants, and have been shown to have a remarkable effect on the muscular system.

829. Many of the metallic substances used in medicine appear to exert a peculiar influence on the nervous system. They are remedies which act locally as irritants, and when administered in small doses, and during a considerable period, as tonics: as such, they have been used with advantage in chorea and epilepsy. Arsenic, copper, iron, silver, and zinc, belong to this class.

830. Cold has already been mentioned more than once as a remedy of great power. Its effects on the circulation have already been considered, (§ 781.) These are accompanied by a sedative effect on the nervous system. But cold produces marked effects on the nervous system, without any corresponding effect on the circulating organs. It blunts sensibility, and therefore subdues pain. Applied suddenly, it is an effective shock, and rouses both the body and mind. Hence the efficacy of cold water dashed in the face of hysteria, where all that is necessary to remove a paroxysm is strongly to excite attention and an effort at self-control; hence, also, its use in syncope and asphyxia. In the disorder of the nervous system which follows severe inflammatory diseases of the brain, it forms a most effective stimulus, rousing the nervous system, and gradually restoring all the functions of the organ. In cases of violent nervous excitement, on the other hand, it acts as a powerful sedative, allaying the irritation of the nervous system, and reducing the frequency of the pulse, subduing the most violent pain, and infallibly securing sleep. Such are its virtues in the violent paroxysms of mania.

5. THE MEANS OF PRESERVING, IMPROVING, AND RESTORING HEALTH.

831. In a large proportion of the cases which come under the care of the physician, both in private practice and among the poor, it is necessary to pay some attention to those circumstances which affect the general health of the patient, and to lay down rules for his guidance in matters which belong rather to the province of hygiène than to the practice of physic. Indeed, it often happens that the only remedial measures which the physician feels called upon to prescribe, consist of a change from bad to good habits of life, from an unhealthy residence or locality to one more conducive to health, from intense application to study or business to repose of mind and complete change of scene and occupation. In a very numerous class of cases, again, change of climate is the appropriate remedy, and the physician is required to make choice of a locality suited to the disease or state of health of the patient. The subject of *climate*, therefore, falls to be considered in this place.

832. The principal matters which require to be regulated with a view either to the preservation of health in the strong, or its restoration in the invalid, are diet, exercise, clothing, condition of dwelling, place of residence, and habits of life.

833. On the subject of *diet*, as applicable to particular maladies and states of system, something has already been said (§ 725).

834. *Exercise*, regulated according to the condition of the patient, is one of the most important of our therapeutic agents. It may be of two kinds—*active* or *passive*: in the one case the patient moves about by the exertion of his own muscles, in the other he is borne from place to place. Walking, running, dancing, rowing, fencing, boxing, wrestling, and all gymnastic exercises and active games, belong to the first class; carriage exercise, sailing, rocking, and swinging, to the second. Riding at a foot-pace belongs also to the class of passive exercise; while the paces which require more exertion combine the advantages of the two classes.

835. Both kinds of exercise call the muscles into play, at the same time that they promote the circulation of the blood. In passive exercises the muscles are employed in maintaining the posture of the body, and the circulation is quickened by the displacement of the blood which accompanies each sudden change in the level of the body.

836. In addition to the advantage derived from the promotion of the circulation of the blood, active exercises, by calling the abdominal muscles into play, promote the natural action of the bowels. Those exercises, too, whether active or passive, which are carried on in the open air, have the incidental advantage of supplying a purer air for the purpose of respiration. They also imply a change of scene and occupation, which reacts favourably on the mind of the invalid.

837. In selecting the kind and amount of exercise to be prescribed, the physician must be guided by the circumstances of each particular case. In the absence of organic disease, and where the patient suffers merely from general debility, brought on by overwork, intense study, or too close an attention to business, the choice of an appropriate exercise must be mainly determined by the circumstances and tastes of the patient himself. If practicable, change of air and scene, with the exercise which travelling implies, should be insisted on; and, where the strength allows of it, pedestrian exercise. A sea voyage is in these cases to be preferred to carriage exercise. When the patient is unable to quit the scene of his studies or business, horse exercise in the morning or evening of the day will be found the most suitable; and this is especially the case with the inhabitants of large cities who cannot readily reach the country on foot. Fencing, rowing, quoit-playing, archery, and cricket, have the double advantage of bringing all the muscles of the body into play, and of compressing a great amount of exercise into a small compass of time.

838. In the case of growing children of delicate health, exercise is of the greatest importance. The active games of childhood, or equestrian exercise, may be combined with instruction in the graceful accomplishments of dancing and fencing. It often happens in these cases that much anxiety is felt respecting the healthy development of the chest, especially where a tendency to consumption is supposed to exist. With a view to promote this important object the manly exercise of fencing may be strongly recommended for young men, and the nearest convenient approach to it for young females. It is greatly to be preferred to dumb-bells, to the clubs, or to other analogous exercises, which consist of tedious repetitions of the same movements. Reading aloud, so strongly recommended by ancient medical authorities, might be revived with great advantage; but in order to guard against the formation of habits of reading injurious to the free play of the lungs, a judicious teacher should be engaged.

839. In patients labouring under organic disease of the lungs or heart, all the stronger exercises, whether active or passive, are inadmissible. Walking on level ground is, in such cases, the strongest exercise which can be safely prescribed, and is greatly to be preferred to almost any form of passive exercise except that of the carriage or garden chair. Running, or even walking at a brisk pace, and all athletic sports, are inadmissible. The more violent exercises, especially rowing in races, have often given rise to these diseases in persons having every appearance of strength and vigour. Gymnastic exercises, requiring a prolonged and violent action of the same muscles, are also open to the same objection.

840. On the subject of *clothing* much misapprehension exists. There is a strong tendency towards over-clothing of the body, and especially of the chest, with a view of guarding against pulmonary disorders. In order to avoid the danger of catching cold, a delicate

patient is often made to wear, in the very height of summer, as many flannels and skins as would guarantee the temperature of the body in a polar winter, and in this way the very risk is incurred which it is deemed so important to avoid. The same error is committed by heaping on the patient a load of bed-clothes, much exceeding what is required to preserve the proper temperature of the body. A more moderate use of warm clothing, then, ought to be insisted on in this class of cases.

841. An opposite error is sometimes committed in very young children, under the erroneous notion of hardening them, but in forgetfulness of the comparative difficulty with which young persons maintain their proper temperature. At the other extreme of life, also, warm clothing is highly necessary, and especially in patients suffering from pulmonary affections.

842. The importance of an immediate change of clothing after exercise accompanied by profuse perspiration, or when the clothes are wet, needs not to be insisted on. In persons subject to perspire freely, cotton or flannel clothing next the skin is to be preferred to articles of linen.

843. The *condition of his dwelling* is of great importance to the invalid. Where there is a free choice, a gravelly or chalky soil, an elevated spot, and a north and south aspect, are to be preferred to a clay soil, a low situation, and an east and west aspect. It is also very important that the house should be sheltered from the east wind. A supply of good soft water is also a great desideratum.

844. A thorough drainage of the soil upon which the house stands, the prompt removal by impervious drains, properly trapped, of all offensive refuse, spacious rooms with open fire-places and windows opening above and below, and staircases well lighted and aired by windows opening upon them, are some of the more obvious requirements of a wholesome dwelling. Staircases lighted by skylights, even when the lights admit of being open, are objectionable, unless they are very spacious.

845. The preservation of our dwellings from dampness is of the very first importance. To accomplish this end, it is not sufficient to make the roof of the house proof against the weather, the basement also requires to be guaranteed against dampness, by raising the floor or pavement on dwarf walls, and providing a movement of air beneath them, by air-bricks, and also by surrounding the house by an area or air-drain, so that the walls may be preserved from contact with the soil.

846. The purity of the air of the several apartments, and especially of the bedroom of the invalid, should be guaranteed by means of *ventilation*. To this end no inhabited room should be without an open fire-place, for the escape of impure air. When the rooms are spacious, no further provision for ventilation is required beyond the facility of

opening doors and windows. But small apartments used as sleeping rooms require a constant provision for the renewal of the air by means of ventilators constructed with a view to the prevention of draughts.

847. In those cases where it is deemed necessary to maintain an equable temperature, stoves should on no account be employed. An open fire-place of sufficient size, and double windows, or, what answers equally well, double panes of glass, or thick plate glass, are greatly to be preferred. In this way any temperature which may be desired can be combined with the advantage of complete ventilation. This mode of insuring a warm pure air is of great importance in pulmonary diseases, especially in the bronchitis of aged persons.

848. With a view to the preservation of the health of young and delicate children, it is essential to provide for the free ventilation of their sleeping apartments. Overcrowding and consequent impurity of the air in such apartments is a common cause of disease in the children even of affluent persons, and the principal source of the high mortality of the children of the poor. In addition to the precautions for insuring thorough ventilation of sleeping apartments, a certain amount of space, not falling short of the thousand cubic feet insisted on in § 185 should be allotted to each child.

849. In cities, and even in rural districts, the external air admitted into the houses both of rich and poor, is often very far from being sweet or pure. In the country the causes of impurity are few in number, being chiefly the gases from stagnant pools, ponds, or marshes, or the effluvia from farm-yards, stables, pig-sties, or heaps of manure. These sources of impurity should always be placed at some little distance from dwelling-houses; at any rate, they should not be suffered to remain in contact with them.

850. In large cities the sources of aerial impurity are much more numerous. In addition to those which exist also in rural districts, but become doubly objectionable from narrow space and imperfect movement of the air, there are others which arise from processes of manufacture peculiar to towns, from the necessity of heaping up, at least for a short time, the dust and ashes removed from our houses, and from the difficulty of consuming the smoke issuing from our chimneys.

851. Among the *habits of life* which most militate against health, and which, so long as they remain unchanged, tend to counteract the effects of the best medical treatment, the most important are sloth, luxury, dissipation, indulgence in the pleasures of the table, the abuse of spirituous liquors, opium, and tobacco, irregularity in the time of taking meals and rest, and want of personal cleanliness.

852. With the exception of the hardships to which the very poorest and most destitute members of society are exposed there is no more fruitful source of disease than inactivity of mind and body. In wealthy communities the number of persons who have no occupation of sufficient

importance to interest and occupy the mind is always very great. Such persons constitute a large proportion of the class of habitual invalids, who are constantly in need of medical advice. In the absence of any fitting occupation, travelling and the wholesome observances of fashionable watering-places, such as early rising, regular hours for meals and exercise, the frequent use of baths, and cheerful and congenial society, are the only remedies of any value which the physician has it in his power to prescribe. As intemperance and indulgence in the pleasures of the table are the besetting temptations of the same class of persons, there is perhaps no better way of guarding against them than by prescribing foreign travel, or a residence at fashionable watering-places.

853. A want of personal cleanliness is more frequently chargeable against persons of education than might at first sight be expected. The practice of daily ablution of the whole body is observed by a comparatively small number of persons; but it is one which ought to be insisted upon as an excellent tonic, as tending to guard the body against catching cold, and as keeping the skin in a proper state for the performance of its functions. The occasional use of the warm bath, to insure a more perfect cleansing of the skin, is also to be recommended. The practice of daily ablution with cold water, followed by friction with a rough towel, or hair gloves, or the flesh-brush, is often of the greatest benefit to those who have an hereditary predisposition to consumption, or who have already manifested a tendency to that disease.

854. The subject of *change of air or climate* is generally esteemed one of the most important among the means of preserving, improving, and restoring health. There are two classes of persons to whom it is usual to recommend a change of climate. The one class consists of invalids who suffer from no defined disease, but whose general health has been impaired by exposure to one or other of the many unwholesome influences which attend a residence in large towns (see § 46 and seq.); the other class consists of persons suffering from some well-defined malady, such as chronic dyspepsia, chronic rheumatism, scrofula, pulmonary consumption, chronic bronchitis, asthma, &c.

855. To the mere invalid, whose constitution has suffered by the cares and anxieties of business, the dissipation of a town life, or the *ennui* of an idle and useless existence, change of climate is chiefly valuable as affording facilities for change of habits, change of scene, and change of occupation. In advising persons so circumstanced, little more is required than to avoid climates positively unhealthy. With this exception, the countries or places which offer the greatest facilities for change of habits and occupation; and in the case of the victim of *ennui*, the greatest facilities for exertion of mind and body, are to be preferred.

856. In advising patients suffering from any of the diseases just specified, a more exact knowledge of climate is required, at the same time that many considerations of personal convenience will have to

be carefully weighed. Assuming that there are no circumstances peculiar to the patient which render a change of residence inexpedient, the medical man will have first to consider the kind of climate best adapted to the disease under which the patient suffers, and then to select from a number of places possessing the required climate the particular one which is, on the whole, to be preferred.

857. In making choice of a climate, we may either consider the state of the patient's system, without reference to the disease under which he labours, or we may be guided solely by the nature of his malady. The state of the system may be either one of relaxation, characterized, if the disease affect any of the mucous membranes, by excessive secretion; if the glandular system, by indolent swellings or ulcers; if the skin, by chronic cutaneous affections; if the locomotive system, by chronic rheumatism and atonic gout. A cold skin, and a weak pulse often below the natural standard of frequency, with general langour of all the functions of the body characterize this state. On the other hand, the state of the system may be one of irritation, with a dry state of the mucous membranes, a harsh dry skin, and a frequent quick pulse, with a tendency to more acute forms of inflammation. In the state of relaxation, a dry bracing climate is indicated; in the state of irritation a mild moist climate. In both states of system, it is important to avoid a great increase of temperature as tending to exhaustion, sudden changes of temperature as giving rise to colds and slight febrile attacks, and the east and north-east winds, as shown by experience to be peculiarly trying to the invalid.

858. These observations will apply to all the diseases in which change of climate is commonly recommended, with the exception of chronic rheumatism, gout, and calculous disorders, in which a higher temperature appears to be advantageous. The climate of the East and West Indies and the Cape of Good Hope is deemed suitable to this class of invalids.

859. As a general rule, the bracing spots adapted to a state of relaxation of the system are those which are elevated, scantily wooded, exposed to the prevailing winds, and consisting of a gravelly or chalky soil; on the other hand, the mild moist climates are to be found in low situations, on clay soils, wooded, and partially or wholly uncultivated, and sheltered from the prevailing winds. As a general rule, too, the climate of the sea-shore is milder and more uniform than that of the interior, being warmer in winter, and cooler in summer. Watering-places have also the twofold advantage of pure sea-breezes and of sea-bathing.

860. Bearing these considerations in mind, it will be easy to point out, among the more common resorts of the invalid, the places in England and abroad which are best adapted to the two opposite states of relaxation and irritation.

861. The mild sheltered places chiefly resorted to on the coasts

of England are Undercliff in the Isle of Wight; Hastings on the south coast; Dawlish, Sidmouth, Exmouth, and Salcombe, on the coast of Devonshire. The sheltered spots in the islands of Guernsey and Jersey offer the same advantages. Among foreign watering-places, Pau in the south-west, and Hyères and Nice in the south-east of France; Rome and Pisa in Italy; Malaga in the south of Spain; and the islands of the Northern Atlantic, namely, Madeira, the Canary Islands, and the Azores; and those of the Western Atlantic, namely, the Bermudas and the Bahamas, have the same mild relaxing climate.

862. On the other hand, the mild bracing spots adapted to invalids suffering from a state of debility and relaxation without irritation, are, in England, Brighton on the south coast; Torquay on the coast of Devonshire; Clifton on the western coast; in France, Montpellier; and in Italy, Naples.

863. The places named in the two preceding sections must be understood to be intended chiefly for winter residence, the summer being spent in suitable inland watering-places, such as Malvern, Cheltenham, Leamington, Tunbridge Wells, Matlock, and Buxton, in England; or in any of the several watering-places among the higher Pyrenees in France, or the better-situated spas of Germany.

864. The climate best adapted for a residence continued during the entire year is perhaps that of Madeira, which to moderate fluctuations of a temperature little exceeding that of the milder parts of England, adds the advantage of a drier atmosphere, except during the prevalence of the autumnal rains.

865. The diseases in which change of climate may be expected to be most beneficial are emphysema, chronic bronchitis, and asthma, and all those affections of the air-passages and lungs in which previous experience has shown that the patient suffers severely in winter and is comparatively well during the summer. The efficacy of change of climate in all the stages of pulmonary consumption, from the incipient to the most advanced stages, is a subject of great difficulty; but there is no doubt that in that condition of health known as tubercular cachexia (the presumed forerunner of tubercular deposit) as in other forms of cachexia, change of climate is advantageous. Whether a mild bracing or a mild relaxing climate is to be chosen will greatly depend upon the state of the system, whether it be one of langour and torpid action, or one of feverish excitement.*

866. There are certain conditions of system in which it is expedient to combine with change of climate the alterative effects of minute doses of saline or other substances in a state of solution; in other words, to select as the scene of the required change of climate, regimen, and occupation, some spot where access can be had to

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* Consult on the subject of Climate, Sir James Clark's able treatise.

mineral waters. Such places abound both in England and on the Continent.

867. The *mineral waters* most in repute may be divided into four classes—*the saline*, *the chalybeate*, *the sulphureous*, and *the acidulous*, to which may be added the *hot springs*. A short description of each of these classes, with the principal watering-places where they are found, will assist the physician in his choice.

(1.) *Saline mineral waters.* These consist of variable quantities of the chlorides, sulphates, carbonates, and nitrates of potash, soda, lime, magnesia, and alumina, to which may be added, as of rare occurrence, free carbonic or sulphuretted hydrogen gas; the salts of iron, in small quantity, with traces of phosphoric acid, iodine and bromine. Sea-water is a concentrated form of this class of mineral waters. These mineral waters act as gentle aperients, and are adapted to the case of patients suffering from dyspepsia, from habitual constipation, and from functional derangement of the liver. The waters of Cheltenham, Leamington, and Scarborough, in England, of Spital-on-Tweed, Pitkaithley, Airthrey, Dunblane, and Innerleithen, in Scotland, and of Ems, Carlsbad, Homburg, Seidschutz, Kreuznach, and Pülna, in Germany, belong to this class. Some of these mineral waters contain minute quantities of iodine and bromine, and, for that reason, commend themselves in scrofulous disorders, accompanied by glandular enlargements. The waters of Kissingen and Kreuznach contain the bromide of sodium in sufficient quantity (a third and a fourth of a grain in a pound of water) to have some effect if taken freely and for a continuance. The strongest waters belonging to this class are, in England, those of Cheltenham and Leamington; in Scotland, those of Airthrey; in Germany, those of Pülna, Seidschutz, Homburg, Kreuznach, Kissingen, and Marienbad.

(2.) *Chalybeate waters.* These waters contain variable quantities of the sulphate and carbonate of iron, and are, therefore, possessed of tonic properties, and are especially adapted to the treatment of anæmia, and of functional disorders of the uterus. They are slightly stimulating, and require to be combined with aperient medicines. The waters of Tunbridge Wells and Harrowgate in England, of Hartfell Spa and Vicar's Brig in Scotland, of Spa and Tongres in Belgium and the Low Countries, of Passy near Paris, and of Rennes in the south of France, belong to this class.

(3.) *Sulphureous waters.* These waters abound in free sulphuretted hydrogen gas, and are prescribed in several forms of cutaneous disorder. The waters of Harrowgate in England, of Moffat, Strathpeffer, and Rothsay in Scotland, of Enghien near Paris, of Barèges in the Higher Pyrenees, of Aix and Leuk in Switzerland, and of Aix la Chapelle in Prussia, belong to this class.

(4.) *Acidulous waters.* These waters are characterized by the quantity of free carbonic acid which they contain. They are also more or less rich in saline ingredients: so that they might be placed with almost equal propriety with those enumerated in Class 1. The excess of free carbonic acid constitutes their claim to a place by themselves. They are applicable in the same cases in which saline waters are found useful, but, being more stimulant, they are better adapted to cases characterised by great debility. The chief mineral waters belonging to this class are those of Ilkeston in Derbyshire, of Kissingen, Marienbad, Auschowitz, Eger, Pyrmont, Spa, Fachingen, Geilnau, Seltzer, and Homburg, in Germany; of Pougues, Mont d'Or, and Vichy, in France; and the Saratoga Congress Spring in America. The waters of Carlsbad and Ems contain comparatively small quantities of free carbonic acid. The chief acidulous waters of Germany, classed according to the quantity of carbonic acid which they contain, beginning with the richest, are—Geilnau, Pyrmont, Eger, Auschowitz, Spa, Fachingen, Homburg, and Seltzer. The waters of Homburg take the first place among the waters of Germany for combined richness in saline substances and free carbonic acid.

(5.) *Hot springs.* These waters are useful both as baths and as internal remedies. As baths they have the advantage of containing, like sea-water, but in smaller quantity, certain saline ingredients, which act as gentle stimulants to the surface. Taken internally they possess, according to their strength, the properties of the class of saline waters. The principal waters belonging to this class are those of Matlock, Bristol, Buxton, and Bath in England, of Carlsbad, Ems, and Wiesbaden, in Germany, of Baden in Switzerland, of Plombières and St. Nectaire in France. Some of these hot springs contain, in addition to saline substances, a certain quantity of free carbonic acid.

868. At some of the favourite watering-places, both in England and on the Continent, springs belonging to the several classes of mineral waters are to be found. Both Cheltenham and Leamington, for instance, have saline, chalybeate, and sulphureous waters. In some springs, again, the constituents of the waters are such as to give them a place in more than one class, and to entitle them to compound appellations, such as *saline chalybeates*, named from their combining the constituents and properties of saline and chalybeate springs.

869. There is no way in which most of the bad habits already referred to (§ 851), can be more effectually broken through than by a residence at some of the least frequented of the continental watering-places. Those which are most frequented are often the worst adapted to this end, as they combine the luxuries and temptations of large towns, with the absence of those natural beauties which offer so wholesome an inducement to pedestrian and other exercises.

6. CLASSIFICATION OF REMEDIES.

870. The principal classes of remedies, with the more important substances contained in each class, have already been pointed out in

the previous sections of this chapter. The following summary, which embodies these points of information, will be found of use, and in accordance with the design of a book of reference.

871. CLASS I. STIMULANTS.—(a) *general*, (b) *local*. *General stimulants* excite all the organs and functions of the body—the circulation, the functions of the brain and nervous system, the secretions, &c. In healthy persons they cause a frequent, full, and quick pulse; in extreme debility, they render the pulse less frequent, but more full. The exhaustion which follows the excessive use of them resembles the effects of the depressants or narcotics.

872. *Local stimulants* act on one or more organs of the body, either directly or through the circulation. They excite those organs to the active performance of their appropriate functions, and this excitement is generally accompanied by increased determination of blood. The reaction which follows their abuse shows itself in sluggish function and circulation. In local debility they act as local tonics.

873. The *general* stimulants in most common use as medicines, are the various forms and preparations of alcohol, ether, and ammonia, turpentine, creosote, phosphorus, cold employed as a shock, heat, and electricity. Amongst the stimulant remedies of less power, are some of those which are commonly designated antispasmodics, as valerian, assafœtida, musk, camphor, &c. To these may be added, serpentary and contrayerva, which appear to combine the virtues of a stimulant and tonic, and are employed with advantage in typhus fever.

874. There are certain remedies also which may be referred to the class of general stimulants, as they are administered by the mouth, enter the circulation, and affect particular systems and tissues. To this class belong nux vomica, and the active principles strychnia and brucia, which affect the muscular system by producing tetanic spasms; the metallic preparations, especially mercury, arsenic, and antimony, which appear to act upon the entire capillary system, including the capillaries of the secreting organs; and the balsams which affect the mucous membranes.

875. The *local* stimulants comprise those which are applied directly to the body, as heat, the escharotics, and rubefacients, applied to the skin; the stomachics, carminatives, and emetics, taken into the stomach; the several classes of purgatives, applied to the mucous membrane of the bowels; and those which, after entering the circulation, act only on certain organs, as the sudorifics, the diuretics, the emmenagogues, &c.; and the stimulating remedies so advantageously employed in diseases of the urinary passages—viz., copaiba, cubebs, and pepper. Some of these remedies have a specific action upon one part of the frame, as the ergot of rye, which stimulates the muscular fibres of the uterus; whilst others have a more extensive range of action, but affect some one organ in a marked degree, as cantharides,

which acts most strongly on the muscular coat and mucous membrane of the bladder.

876. CLASS II. TONICS.—(*a*) *general*, (*b*) *local*. These are remedies which produce little or no direct sensible effect on the circulation, nor on the more obvious functions of the brain and nervous system. Their action is gradual, and consists, as the term implies, in giving tone and firmness to all the textures of the frame, by improving the state of the blood, or by increasing the contractility of the capillaries of every part of the body.

877. *General tonics* are either strong stimulants given in small doses, or weak stimulants in larger ones. As they are administered in states of debility, the characteristic effect of the stimulant on the circulation is not perceptible.

878. *Local tonics* are those remedies which restore the relaxed capillaries of parts to which they are applied to their healthy condition. These, too, are stimulants applied with caution, and of strength proportioned to the condition of the parts affected.

879. The principal *general* tonics are the stronger metallic preparations in small doses, or the less active, as zinc and steel, in larger quantities; the mineral acids, and a variety of vegetable substances, as myrrh, cascarilla, gentian, quassia, serpentary, cinchona, quina, &c. To these must be added, cold applied repeatedly in the form of shock, and followed by reaction. The *local* tonics are, nitrate of silver, sulphate of copper, cold in the form of *douche*, &c.

880. CLASS III. DEPRESSANTS.—The action of depressants is the reverse of that of stimulants. They prostrate the powers and functions of the entire frame. They increase the frequency, but diminish the fulness and force of the heart's contractions, except where they remove an existing disease accompanied by a frequent, full, and hard pulse: in this case they render the pulse less frequent, smaller, and softer.

881. The best depressant which we possess, next to bloodletting, is tartar-emetic. The lobelia inflata belongs to the same class. Tobacco is still more powerful, but it is a narcotic as well as a depressant. Digitalis, ipecacuanha, squill, and colchicum possess this quality in a high degree, but with certain peculiarities of action.

882. CLASS IV. SEDATIVES.—(*a*) *general*, (*b*) *local*. This class comprises those remedies which soothe excitement of the nervous system, without producing a state approaching to syncope, on the one hand, or that of narcotism, on the other. They bear to depressants nearly the same relation that tonics do to stimulants. Local sedatives are remedies which blunt nervous sensibility, soothe pain, and allay spasmodic action of the muscular fibres.

883. Among *general* sedatives, cold is the most important. Belladonna, conium, and stramonium, are of the same class. The same

substances locally applied are *local* sedatives. Nitrate of potash trisnitrate of bismuth, and the preparations of lead, belong also to this class of *local* sedatives. Depressants in small doses become sedatives, as stimulants in small doses are tonics.

884. CLASS V. NARCOTICS.—The property of this class is to produce sleep, and when given in poisonous doses, coma and apoplexy. Morphia is the type of this class, to which belong carbonic acid, carbonic oxide, and sulphuretted hydrogen gases, hyoscyamus, lactucarium, camphor, and hydrocyanic acid. Opium and nutmeg combine a narcotic and stimulant property, whilst the hop is a narcotic and tonic.

885. In addition to the foregoing classes of remedies, there are other groups of less importance which require only a cursory mention: such are the emollients, the antacids, the antilithics, the anthelmintics, &c. The nature and mode of operation of the substances included in these groups are sufficiently obvious.

886. For a more detailed account of the substances and pharmacopœial preparations belonging to the several classes just enumerated, the reader is referred to the collection of Formulæ at the end of the second part.

PART II.

PRACTICE OF MEDICINE.*

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GENERAL DISEASES.

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SPECIAL DISEASES.

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7. Diseases of the organs of sense.
8. Diseases of the skin and its appendages.
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* In the earlier editions of this work, Cullen's Nosology was followed; in the present, that order of arrangement is adopted which seems most likely to be useful in a practical work. It is not founded upon hypothetical principles, but is intended to bring together those subjects which have the most obvious connexion with each other.

GENERAL DISEASES.

CHAPTER I.

STATES OF SYSTEM.

Plethora	The Plethoric State.
Anæmia	The Anæmic State.
Cachexia	The Cachectic State.
Febricula	The Febrile State.
Mimosis Inquieta	The Nervous State.

The subjects treated in this chapter have peculiarities which entitle them to a place by themselves. They are rather disordered states of system than diseases properly so called. Each of them constitutes a more or less permanent departure from health, not necessarily complicated with any local affection, and often present and cognizable in combination with specific and well-defined maladies. A plethoric, an anæmic, or a cachectic subject, or one suffering from extreme debility, or from a group of nervous symptoms, may become the subject of one and the same disease, such as typhus fever, or small-pox, which disease will be materially influenced in its character and progress by that pre-existent *state of system.* The treatment, also, which it may be proper to adopt, with a view to the cure or relief of the disease itself will be materially influenced, and in some cases, altogether determined, by the state of system upon which the disease has supervened. Again, in all those cases in which the indications for the treatment of an existing disease are obscure, or the appropriate remedies are not yet discovered, the only course open to the physician is to direct his prescriptions to the state of system. Nor are these states of system unimportant in themselves; for not only are some of the symptoms which characterize them sufficiently painful or distressing to require medical aid, but they are apt to be confounded by careless or ignorant observers, with the symptoms of diseases requiring very different and, generally speaking, much more active treatment. Nor ought it to be forgotten, that these states of system may be themselves brought on by several analogous local or general causes, and that to recognise the state of system is to possess a clue by which we may trace out that often obscure, and little suspected, origin of the whole existing disorder. This observation applies with peculiar force to the state of system designated by the expressive epithet, *Mimosis Inquieta.* For these reasons the contents of this chapter have been placed by themselves, and have been made to precede the several diseases properly so called.

PLETHORA—THE PLETHORIC STATE. FULNESS OF BLOOD.

SYNONYM—GENERAL HYPERÆMIA.

THIS disorder, which consists in an excessive quantity of blood, or in a superabundance of the red particles and fibrin, the quantity remaining unchanged, may exist in various degrees of intensity from that slight degree known as a full habit of body, and unaccompanied by any marked disorder of the circulation, up to that more intense form in which the circulation is oppressed, and the functions directly connected with it seriously deranged.

SYMPTOMS.—The general aspect of the body full and florid; the capillaries of the surface injected; the redness of the skin momentarily removed by pressure: the pulse frequent, full, firm, and bounding; or infrequent, indistinct, and labouring; or irregular in force and frequency, according to the degree in which the heart is oppressed: tongue clean and red, or slightly furred; appetite good, or, in extreme cases, variable; bowels generally confined; skin dry; extremities generally cold; palpitation and dyspnœa on exertion; frequent sighing; dull, heavy pain in the head; listlessness; debility.

CAUSES.—*Predisposing.*—A peculiar habit of body. *Exciting.*—The prolonged use of a highly-nutritious diet: sedentary habits: inadequate exercise, with free exposure to the air.

PROGNOSIS.—Favourable; but this state of system, though admitting of improvement, can rarely be altogether removed.

COMBINATIONS.—Suppression of the menstrual discharge in young females. Aggravated nervous symptoms (see Mimosis Inquieta, p. 232), in females, at or about the change of life. Hæmorrhoids in both sexes.

TERMINATIONS.—In local inflammations and hæmorrhages; in apoplexy; in hypertrophy of the heart.

TREATMENT.—*Indication.*—To diminish the quantity of blood, or lower the proportion of the red particles and fibrin.

In the common run of cases this may be best effected by the frequent use of saline aperients, a vegetable diet, and abstinence from spirituous liquors.

In extreme cases, and where there is a threatening of local disease, general bloodletting is required

The quantity of blood abstracted must depend on the effect produced, and the relief afforded. The system will often safely bear the removal of forty or fifty ounces or more. It should be taken from a small orifice in the semi-erect or recumbent posture. The pulse should be examined, to ascertain the effect produced. Where it is frequent, full, and bounding, blood may be abstracted till it falls to its natural frequency and force; if it is labouring, till it becomes full and free; if irregular, until it becomes regular. As a general rule, it is better to avoid the letting of blood, and to trust to the prolonged use of abstinence, exercise, and saline aperients.

To prevent the rapid formation of fresh blood, a diet consisting chiefly of vegetables, with small quantities of animal food, and total abstinence from malt or spirituous liquors, must be enjoined. The bowels must be kept freely open by the compound rhubarb or aloetic pill at night, followed by saline aperients every morning, or twice or thrice daily. The following formula is a suitable one for a saline aperient:—

℞. Magnesiæ sulphatis ℥i
Magnesiæ carbonatis ʒi,
Aquæ menthæ pip.
Aquæ āā f℥iv. M. f. Mistura.

Two table spoonfuls to be taken three times a-day.

If in females the disease is complicated with amenorrhœa, blood may be taken from the groin by from four to six, or more, leeches applied at the menstrual periods. (See Amenorrhœa.)

ANÆMIA.—THE ANÆMIC STATE.

Varieties.—1. Acute anæmia, or the effects of loss of blood. 2. Simple chronic anæmia. 3. Cachectic chronic anæmia.

1. Acute Anæmia. The Effects of Loss of Blood.

Acute anæmia is the consequence of a sudden and large loss of blood, and consists in a diminution of the quantity of the blood without any alteration in the proportion of its constituent parts.

Symptoms.—The most familiar of the effects of loss of blood is *syncope*, of which the symptoms are giddiness, followed by loss of consciousness; suspension of respiration alternating with deep sighs; the pulse and beat of the heart scarcely, if at all, perceptible; the surface pale, and bedewed with cold perspiration. Recovery takes place with momentary delirium, yawning, deep sighs, sickness, and a gradual return of colour to the skin, and of pulse to the heart and wrist.

In profuse hæmorrhage, the state of syncope and of reaction alternate. In cases of fatal hæmorrhage, the symptoms become gradually and progressively worse; the countenance paler and more sunken; the extremities colder and colder; the breathing panting, gasping, or stertorous; the pulse imperceptible; restlessness and jactitation are followed by coma, or convulsions; at length, the patient's strength is exhausted, and he sinks, gasps, and expires.

Reaction, or recovery from a state of exhaustion, is generally gradual, but its symptoms are often peculiar and strongly marked. *Excessive reaction* is characterised by forcible beating of the carotids, with a sense of throbbing in the head; palpitation of the heart; throbbing in the scrobiculus cordis and in the course of the aorta, and a frequent, bounding, and often irregular sharp pulse; a hurried, panting, sighing respiration; restlessness, jactitation, mental agitation, hurried manner, and sudden muscular movements. Sometimes the patient has suddenly raised himself to the sitting posture, and as suddenly died. In this state the head suffers much, and is morbidly excited. There are intolerance of light and sound, sleep disturbed by fearful dreams, waking hurried and perplexed, delirium, noises in the head, flashes of light before the eyes, and sense of tightness round the head, as if it were firmly bound by an iron hoop. The throbbing of the arteries is accompanied by the "bruit de soufflet." Mania, coma, amaurosis, and deafness are frequent concomitants of this state.

The sinking state is characterised by diminished energy of all the powers, especially of the nervous system. There are snoring, stertor, blowing up of the cheeks, dozing, want of recollection, sometimes slight delirium; crepitus in the lungs, passing into rattling in the air-passages; hurried, sighing, catching respiration; short cough; pulse and beat of heart fluttering or imperceptible; tympanites; and loss of power over the sphincters. The pale and sunken countenance, restlessness, jactitation, delirium, and cold extremities, announce the approach of death, which generally takes place amid convulsions.

POST-MORTEM APPEARANCES. — Effusion of serum within the brain; œdema of the lungs; increased bronchial secretion; serous effusion into the pleura and peritoneum; general œdema or anasarca; tympanitic distention of the bowels.

TREATMENT.—*Indications.* I. To promote the formation of new blood. II. To support the strength. III. To soothe the existing nervous excitement.

I. The first indication is fulfilled by the frequent administration of nourishing food and wine.

II. and III. The second and third indications are met by a combination of stimulants and opiates, as in the following prescription, which may be given three or four times a-day.

℞. Ammon. sesquicarb. gr. v. or gr. x.
Tinct. opii, ♏ x. to ♏ xx. or ♏ xxx.
Mist. camphoræ, f ℥i. or f ℥iss.

Still larger doses of laudanum, or corresponding full doses of solid opium are often required to procure sleep in the restlessness attendant upon extreme exhaustion.

The recumbent posture must be retained so long as the extreme debility lasts; and sudden changes of position must be strictly forbidden.

The state of *syncope* must be treated by placing the patient in the recumbent posture with the head low, sprinkling the face with cold water, or dashing it on the body, applying ammonia to the nostrils, and frictions to the extremities, and administering stimulants, such as brandy or wine and water, internally.

In the sinking state, strong stimulants, such as hot brandy and water, or pure brandy, must be given in small quantities at short intervals; and, where the cause of the sinking is not in itself necessarily fatal, artificial respiration, and galvanic shocks passed through the chest may be resorted to as a last means of restoration.

2. SIMPLE CHRONIC ANÆMIA.

The term chronic anæmia is here used to designate a state of system, coming on gradually, continuing generally for some weeks or months, and dependent on a decrease in the quantity of the red particles and solid constituents of the blood.

SYMPTOMS.—Universal pallor of the skin, conjunctiva, gums, and lining membrane of the mouth; dead whiteness of the substance of the tongue; cold extremities; debility; palpitation and dyspnœa on the slightest exertion, accompanied by violent pulsation of the carotid arteries; faintings; headache, consisting generally in a fixed pain over the eyebrows or on the top of the head; pain under the left breast; pulse frequent, small, and quick (in extreme cases aptly described as a *jerking* pulse), increased by exertion, and accompanied by violent throbbings of the carotid arteries and cerebral vessels, and easily accelerated by emotions of the mind. The patient is easily agitated by slight noises or unexpected events, and suffers from depression of spirits, and in some cases from hysteric fits; the secretions and excretions are generally scanty; and the bowels often torpid.

PHYSICAL SIGNS.—On applying the stethoscope over the large veins of the neck, a humming sound is heard (the *bruit de diable*, or humming-top sound). In extreme cases, a *bruit de soufflet*, bearing a strong resemblance to the puffing of a locomotive, is heard in the carotid and other large arteries. This bellows sound is very rarely constant; but is brought on by any sudden excitement of the circulation. In the space above the clavicle, the venous murmur and the arterial bellows sound are often heard at the same time, in which case there is a continuous murmur, with augmentations at regular intervals, corresponding to the beats of the heart.

CAUSES.—Obscure. It is peculiarly a disorder of females, and is generally, but not always, associated with scanty menstruation or amenorrhœa; and it frequently precedes the first appearance of the menses. The proximate cause is a diminution in the quantity of the fibrin and red particles of the blood.

Anæmia occurs occasionally in the male subject, after the fevers of tropical climates; and in bakers and other working men following exhausting occupations, without sufficient time for rest and refreshment. It is not connected with any other diseased condition, and it yields to the use of steel.

PROGNOSIS.—Favourable; though the recovery is sometimes slow and tedious.

DIAGNOSIS.—From the effects of loss of blood or other drains upon the system, by the history of the case. From chlorosis, by the absence of disorder in the functions of the alimentary canal.

TREATMENT.—*Indication.* 1. To promote the formation of the red particles of the blood by the use of the preparations of iron. These should be given in full doses. The best preparation is the dried sulphate of iron, and the proper dose in well-marked cases of anæmia, five grains three times a-day. An excellent combination consists of five grains of dried sulphate of iron, with an equal quantity of extract of gentian three times a-day. If the bowels are torpid, the compound aloetic pill may be given every night, or as often as may be required.

Whenever the skin, gums, and tongue are pale, whatever may be the other symptoms present, steel may be safely given in full doses. I have administered it in five-grain doses three times a-day, in a well-marked case of anæmia during the most severe and distressing headache, and with the carotid arteries pulsating violently, not only with safety, but with the most prompt and decided benefit. I know of no remedy upon which such uniform dependence can be placed. I have administered the dried sulphate of iron, combined with extract of gentian, in ten-grain doses; and an anæmic female, who is in the habit of taking these pills as other persons take stimulants, swallowed on one occasion twelve pills, containing half a drachm of sulphate of iron, in one day. The same preparation, in the same liberal doses, may be given with like advantage in the few cases of anæmia which occur in the male subject. (G.)

For other preparations of iron and their doses, see Tonics in the Collection of Formulæ.

A generous diet, with a moderate allowance of wine, is indicated in cases of anæmia accompanied by marked debility.

Mercurial preparations should be administered with caution in anæmia, as there is reason to believe that salivation is very readily brought on in this state of the system.

When anæmia is accompanied by amenorrhœa, aloetic aperients, such as the compound aloetic pill of the Pharmacopœia, are indicated in preference to other medicines of the same class.

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3. CACHECTIC CHRONIC ANÆMIA—CHLOROSIS—GREEN SICKNESS.

This disease is, as it were, intermediate between anæmia and cachexia, partaking of the characters of both. The blood is altered in quality, containing less of the red particles and of the solid ingredients, at the same time that the secretions are depraved.

SYMPTOMS.—Heaviness; listlessness; fatigue on the least exertion; palpitations of the heart; throbbing of the carotid arteries; pains in the back, loins, and hips; flatulency and acidity in the stomach and bowels, and the symptoms of dyspepsia.

The appetite is often singularly depraved; and lime, chalk, and other absorbents are sometimes greedily eaten, when the accustomed food is rejected. As the disease advances, the lips lose their colour; the eyes are encircled with a livid areola, the face becomes pale, and assumes a dusky-yellowish hue; the feet are affected with œdematous swellings; and there is every indication of want of power and energy in the constitution. The breathing is hurried by the slightest exertion; the pulse is frequent, quick, but small; and the patient is affected with various symptoms of hysteria, with cough, and sometimes with confirmed hectic fever.

CAUSES.—Those of anæmia and cachexia combined. Amenorrhœa is a general, though not a constant, accompaniment.

TREATMENT.—That proper to anæmia and cachexia combined. The *indications* are: I. To restore the normal character of the blood. II. To correct the depraved secretions.

I. The first indication is fulfilled by the use of steel in full doses. The combination already recommended (see Simple Chronic Anæmia) of sulphate of iron, with extract of gentian, is perhaps the best and only one that need be used. If the form of mixture be preferred, sulphate of iron may be combined with small doses of sulphate of magnesia. Small doses of calomel, or hyd. c. cretâ, may be combined with the steel with much advantage. A nourishing and wholesome diet, regular exercise, and pure air must also be prescribed. Change of air, and the use of any of the chalybeate waters will be found beneficial. (See Part I., p. 217.) Sea-bathing, and the use of the shower-bath may also be recommended.

II. The second indication is fulfilled by gentle aperients of aloes, myrrh, and bitters, combined with any of the mercurial preparations in small doses. In the common run of cases the pills of steel and gentian may be given twice or thrice daily, and one or two of the compound aloetic, or compound rhubarb, pills every night.

The menstrual discharge may, in most cases, be safely left to itself, but if any urgent symptoms connected with the functions of the uterus be present, they must be treated by the remedies pointed out under amenorrhœa, dysmenorrhœa, &c.

In addition to the foregoing two forms of chronic anæmia—the simple chronic anæmia, and the cachectic chronic anæmia, or chlorosis—a third form has been described, and named by Professor Bennet, of Edinburgh, Leucocythæmia (from λευκος, white, κυτος, cell, and ἁιμα, blood). The symptoms are those of anæmia. The surface is pale, and the skin often the seat of œdema. The blood, examined under the microscope, is found to abound in white corpuscles. The disorder, as hitherto observed, has been associated with disease of the abdominal viscera, especially of the spleen, which is often greatly enlarged. The liver is less frequently the seat of disease. Ague, or the severe intermittent or remittent fevers of hot climates, are the common forerunners of these diseases of the liver and spleen, and of the leucocythæmia which accompanies them. The treatment will consist in the simultaneous use of preparations of iron, and of the remedies indicated for the concomitant visceral disease.

I have, in one or two instances, seen this state of system following service in hot climates, and attacks of intermittent or remittent fever, without, however, any serious disease of the liver or spleen, entirely cured by the use of preparations of steel. (G.)

CACHEXIA—BAD HABIT OF BODY.

The term Cachexia is commonly applied to an unhealthy condition of system, due to some poison circulating in the blood, and introduced from without—or to some important change in the composition of that fluid, leading to the retention of effete matters, and due to the prolonged operations of unwholesome atmospheric influences, improper diet, or the abuse of spiritiuous liquors. It is often the forerunner of local disease, or it is found associated with it.

Varieties.—Cachexia syphilitica. Cachexia tubercularis. Cachexia Londinensis. Cachexia Africana.

SYMPTOMS.—The complexion sallow and dusky, the skin harsh and dry; the frame more or less emaciated; the pulse frequent, small, and compressible; the tongue clean, moist, and red, or slightly furred; the appetite capricious, often craving and voracious, with a long train of dyspeptic symptoms; the alvine discharges foul, dark, slimy, pitchlike, and showing no trace of healthy fæces; the urine high-coloured, and depositing a dark and often fetid sediment; the perspiration acrid and stinking; the breath offensive. Enlarged tonsils, and aphthæ are frequent concomitants.

DIAGNOSIS.—From mere *anæmia*, by the sallow and dusky countenance, as distinguished from the clear and pale skin, and by the depraved character of the secretions and excretions.

CAUSES.—Unwholesome diet; want of proper exercise; intemperance; continued exposure to miasmata, to a cold, damp atmosphere, or to unhealthy climates; the impure air of crowded cities; the gradual operation of mineral poisons, as mercury, arsenic, copper; of animal poisons, such as the syphilitic virus.

TREATMENT.—*Indications.* I. To remove the exciting cause. II. To improve the condition of the circulating fluid.

I. The exciting cause may be removed, in the several cases specified, by proper diet, exercise, change of air, ventilation of apartments in which unhealthy occupations are carried on, change from unwholesome employments to healthy occupations, or, in the case of syphilitic cachexy, by inducing a new action in the system by preparations of mercury, or by the iodide of potassium or iron.

II. The condition of the circulating fluid may be improved by proper diet, consisting of a due mixture of animal and vegetable food, with a proper proportion of acescent fruits and vegetables; decoctions of herbs, combining a mucilaginous with a tonic principle, as the decoction of sarsaparilla; due attention to all the secretions; and the administration of preparations of mercury, in alterative doses. Of these, the best is Plummer's pill, which may be given in doses of three, four, or five grains, three times a-day, with the decoction of sarsaparilla. The iodide of potassium, or of iron, may be substituted in many cases for the preparations of mercury. The proper action of the bowels should be secured by gentle aperients frequently repeated, and the skin should be kept constantly clean by daily ablution in the morning, or by the occasional use of the warm-bath. The shower-bath may also be used with advantage. Change of air and of scene, and a course of mineral waters, especially the chalybeates, may be resorted to with the greatest benefit, or a course of saline waters may be followed by a course of chalybeates. In the intemperate, the gradual diminution and ultimate abandonment of the use of spirituous liquors must be insisted on.

FEBRICULA—THE FEBRILE STATE.

Symptoms.—Increased heat of surface, increased frequency of pulse, flushed face, slightly furred tongue, thirst, loss of appetite, restlessness, lassitude, and wandering pains in the head, back, and limbs, constitute the ordinary symptoms of the febrile state. These symptoms are sometimes ushered in by shivering, and generally pass off by perspiration. When due to trivial causes, they are ordinarily of short duration. The more severe and prolonged forms of fever are described under other heads. (See Chapter III.)

Causes.—Fatigue; exposure to cold; heated rooms; intemperance in eating or drinking; slight local inflammation.

Treatment.—*Indications.* I. To remove the cause. II. To abate the febrile action.

I. If the febrile attack has originated in intemperance in eating or drinking, an emetic should be administered. (See Emetics.)

II. In the common run of cases, the second indication may be fulfilled by administering a common saline aperient. (See Aperients.) Perspiration may be promoted by ten grains of Dover's powder given at bed-time, followed by a saline aperient in the morning.

MIMOSIS INQUIETA—NERVOUS STATE.

Symptoms.—Frequent flushings of the face, tremblings, palpitations, dyspnœa, pain in the left side, giddiness, faintings, loss of recollection, depression of spirits, anxiety and timidity, are the familiar symptoms of this state, as it occurs in females. In extreme cases, the patient is startled by the slightest noises, is in a state of constant apprehension of death, or of some great evil about to befal her; or she imagines that she has done something wrong, or is harassed by constant fears that she may be tempted to commit some great crime. The sleep is often disturbed by frightful dreams. Neuralgic pains with extreme weakness of the hands and forearms are of very common occurrence, and give rise to an unfounded alarm of paralysis. There are indigestion and flatulence, and the bowels are frequently costive. In other respects, the health does not suffer materially. The patient often wears the appearance of good health, does not lose flesh, and may even be of a full habit of body. Hysterical paroxysms are sometimes superadded to the other symptoms, and the disease occasionally terminates in mania.

In men, the symptoms are usually less strongly marked; palpitation, dyspnœa, pain in the left side, depression of spirits, timidity, and disturbed sleep, being the leading symptoms.

Causes.—*Predisposing.* The female sex. It is rare in men, though it does occasionally occur. *Exciting.*—In the female excessive discharges, as hyperlactatio, leucorrhœa, menorrhagia, diarrhœa, and repeated loss of blood; convalescence from severe diseases; change of life, and the suppression of the menstrual discharge in females of middle age. In both sexes, fright, grief, anxiety, overwork, scanty nourishment, or fatigue. In men, excessive study, anxiety, dissipation, onanism, and spermatorrhœa.

Diagnosis.—From hysteria, by the absence of hysteric fits, and of the clavus and globus hystericus. Hysteria, in its usual form, may, however, occur with mimosis, and it is not uncommon to consider the symptoms just described as hysterical.

Prognosis.—Favourable, but recovery generally slow and tedious.

Treatment.—*Indications.* I. To remove the cause. II. To support the patient's strength. III. To allay the existing nervous irritation.

I. To fulfil the first indication, the treatment must vary with the cause.

II. The second indication requires the use of tonics, a generous diet, fresh air, and exercise.

III. The third indication is fulfilled by the use of sedatives, such as opium, hyoscyamus, and digitalis, in combination with tonics.

The following prescription, slightly varied according to circumstances, will be found to be suitable to the great majority of cases. It may be given three or four times a day.

℞. Acidi sulph. dil. ♏x. or ♏xx.
Tr. opii, ♏v. or tr. hyoscyami, ♏xx.
Tr. digitalis, ♏v. or ♏x.
Infus. quassiæ, ℥i. or ℥iss.

The acid may be given in its full dose when the disorder is dependent on excessive discharges; quinine may be substituted for the tonic infusion; the compound infusion of roses may be substituted for the acid and tonic infusion. If the bowels are costive, the compound rhubarb or compound aloetic pill may be given in five or ten grain doses every night, or as often as they are required. These aperients may be combined with alterative doses of mercurial preparations if such are indicated.

When the symptoms of mimosis inquieta occur in anæmic females the tinctura ferri sesquichloridi, in doses of from ten to twenty minims, may be substituted for the dilute sulphuric acid.

Where great debility is present, stimulants may be substituted for tonics, as in the following prescription:—

℞. Ammoniæ sesquicarb. gr. v.
Tinct. opii. ♏v.
Misturæ Camphoræ, ℥i.
M. f. Haustus, ter die sumendus.

Or, see formulæ "Stimulants with narcotics, sedatives, and anodynes," in Appendix.

After great and sudden losses of blood, or after the long continuance of exhausting discharges, the dose of opium may be increased to ten drops or even more, and the above mixture may be given as often as four times in the day. Bleeding and depressing remedies are contraindicated in cases of Mimosis Inquieta.

CHAPTER II.

PHLOGOSIS	Inflammation.
CONGESTIO	Congestion.
HÆMORRHAGIA	Hæmorrhage.
HYDROPS	Dropsy.
ERYSIPELAS	St. Anthony's Fire.

PHLOGOSIS—INFLAMMATION.

VARIETIES.—1. Acute. 2. Chronic.

1. ACUTE INFLAMMATION.

SYMPTOMS.—The symptoms of inflammation are—I. Local. II. General or Constitutional.

1. *Local Symptoms. When external.*—Redness, swelling, heat, and pain. The *redness* arises from the increased quantity of red blood contained in all the vessels of the part; the *swelling* from the same cause, combined with the secretion of serum, albumen, or lymph; the *heat* exceeds that of other superficial parts, but never rises higher than that of the blood: the *pain* is explained by the larger supply of blood to the nerves of the part, combined with the pressure of the surrounding textures upon them. It is accordingly most severe where the surrounding textures are unyielding, as in whitloe; comparatively slight, or only produced by pressure, in the lax mucous membranes.

When internal,—the symptoms of inflammation are pain and disturbance of function. The *pain* in parts which can be submitted to pressure is increased by that pressure, and this forms an important means of diagnosis. The *disturbance of function* consists, in secreting organs, of increase, alteration, diminution, or total suppression of their appropriate secretion, according to the degree of the inflammation; in other organs, it consists of various degrees of excitement—in the brain, rapid succession of ideas, mental irritation, delirium; in the eye and ear, impatience of light and sound, or false sensations, such as flashes of light, musical notes, &c.; in the lungs, dyspnœa; in the heart, palpitation.

2. *General or constitutional symptoms.*—In healthy persons, the group of symptoms commonly known as *Inflammatory Fever:* namely, rigors, succeeded by pain in the head, back, and limbs; lassitude; nausea, and loss of appetite; increased heat of surface; thirst; frequent, full, hard pulse; dry skin; furred tongue; scanty and high-

coloured urine; and constipation. There is a slight aggravation of the symptoms towards evening, and a slight remission in the morning. The sleep is disturbed, and the patient is somewhat delirious. When blood is drawn it is found cupped and buffed.

In severe and extensive inflammation, or in unhealthy persons, the symptoms are those of *Constitutional Irritation:* namely, extreme anxiety and restlessness; hurried respiration; frequent rigors; a frequent, quick, sharp pulse; low muttering delirium; and, in fatal cases, death by exhaustion.

In the drunkard, the symptoms are those of delirium tremens. (see Delirium Tremens).

In extremely debilitated subjects, those of hectic fever (see Hectic Fever), or of the typhoid form of continued fever (see Continued Fever).

TERMINATIONS.—1. Resolution. 2. Increased secretion. 3. Hæmorrhage. 4. Adhesion. 5. Softening. 6. Induration. 7. Suppuration. 8. Gangrene.

CAUSES.—*Predisposing.* Sanguine temperament; full habit of body; general debility.

Exciting.—1. Mechanical and chemical irritants. 2. Cold and heat. 3. Certain alterations in the condition of the circulating fluid. 4. Morbid poisons circulating in the blood. 5. The excitement of the circulation in fever. 6. Local congestion, from imperfect elimination of effete matters.

CAUSES WHICH MODIFY THE CHARACTER OF INFLAMMATION:—

1. Texture. 2. Condition of system.

1. *Texture.*—The *serous* membranes in acute inflammation take on the adhesive inflammation, very rarely the suppurative; in less degrees of inflammation, they pour out serum or liquid albumen. The *mucous* membranes secrete mucus, pus, and, in rare cases, coagulable lymph, and are prone to suppuration, and not to adhesion of opposed surfaces, as also to softening. Inflammation of the *cellular* tissue causes a secretion of serum, and, in higher degrees of inflammation, of coagulable lymph and pus. Its common termination is by *abscess.* Inflammation of the cellular tissue is called *phlegmonous* inflammation. The *parenchymatous* substance of organs is apt to be softened by acute, and hardened by chronic, inflammation; it is also liable to abscess and gangrene. Of the *fibrous* tissues, tendon and ligament are prone to gangrene, cartilage to ulceration. *Osseous* inflammation terminates in gangrene (caries and necrosis). The *skin* resembles the mucous membranes in being prone to suppuration. Diffused redness, pimples, and gangrene are also common terminations of cutaneous inflammation. Vesicles, pustules, and spots of ulceration and gangrene also occur on the skin, and constitute the great variety of skin diseases.

The general, or constitutional symptoms of inflammation also vary materially with the tissue affected. Thus, in inflammation of the *serous membranes*, there is little heat of surface, little muscular debility, little tendency to delirium, with slight acceleration of pulse; but there is acute pain, great tolerance of loss of blood, an excess of fibrin, and a cupped and buffed appearance in the blood itself. In inflammation of the *mucous membranes*, on the other hand, there is little pain, little tolerance of loss of blood, no increase of fibrin, and the absence of the cupped and buffed appearance. There is, however, an exception to this rule in the case of croup, and of certain rare diseases of the mucous membrane of the lungs and bowels, in which the mucous membrane takes on one characteristic feature of inflammation of the serous membranes, namely, the formation of highly tenacious secretions, known as *false membranes*.

2. *Condition of system.*—The effect of condition of system is well illustrated by the exanthemata. In *measles*, the inflammation which prevails is similar to that produced by a common cold, and, in severe cases, leads to the effusion of coagulable lymph from the larynx and trachea; in *scarlatina*, there is a disposition to ulceration in the mucous membrane of the pharynx and adjoining parts; in *small-pox*, the inflammation leads to gangrene, followed by suppuration around the dead points. Another illustration of the modifications produced by states of system, is afforded by common inflammation of the skin contrasted with erysipelatous inflammation.

It is of the utmost importance that the practitioner should be familiar with the constitutional symptoms which mark the several terminations of inflammation. *Acute adhesive inflammation* is accompanied by a full, strong, hard pulse, or a small wiry pulse, somewhat increased in frequency, little or no heat of skin, little or no headache, vertigo, or delirium, no muscular tremor or debility, slight change in the character of the urine, and great tolerance of bloodletting. *Suppuration* is announced by darting and excruciating pains, by severe, and often by repeated, rigor, occurring in some cases almost with the regularity of ague, and followed by heat and sweating—the symptoms, in fact, of hectic fever. *Gangrene* is indicated by a sudden cessation of pain, by collapse of the entire system, pallor, cold clammy sweat, sunken features, sometimes low delirium, sometimes peculiar self-possession. A dry brown tongue, sordes on the teeth, a small frequent, feeble pulse, and the other symptoms of the typhoid state, often precede the fatal termination of extensive or long-continued inflammations.

Treatment.—The remedies employed in the treatment of *acute* inflammation are either general or local. The *general remedies* are bloodletting by venæsection or arteriotomy, the tartrate of antimony, in full doses of a fourth of a grain or more, and the preparations of mercury, especially calomel and blue pill, administered in repeated doses, so as to affect the system; and assisted by the frequent use of strong saline aperients. In internal inflammations, general and local bloodletting, tartrate of antimony, mercury, and counter-irritants are the remedies most in use. The *local remedies* are local depletion by leeches, cupping, or scarification; division of the part; cold; cataplasms and fomentations, and counter-irritants.

2. Chronic Inflammation.

Symptoms.—Those of the acute form, but in a less degree of intensity, and running a longer course. The redness is of a more dusky hue; the heat little, if at all, above the natural standard, and the pain very slight, or only produced by pressure. The functions of internal parts which are the seat of chronic inflammation, are generally languidly performed, and the secretions are diminished in quantity. In chronic inflammation of the cellular tissue, serous effusion takes the place of the more varied products of acute inflammation.

Treatment.—In *chronic* inflammation, local remedies alone are employed, the general remedies being used to improve the health, and not for the purpose of removing the inflammatory action. The local remedies most in use are, moderate depletion by leeches or cupping, stimulants, which have the effect of causing the capillaries to contract, and counter-irritants. Of stimulants, the most efficacious are nitrate of silver, applied over and around the inflamed part; tincture of iodine; iodine ointment, &c. The capillaries may also be caused to contract, and chronic effusions may be removed, by the cold douche, or by electric shocks passed through the part affected. In chronic inflammation of the lower extremities, a graduated pressure is also of great service, by supporting the relaxed vessels.

For the theory of inflammation see Part I., p. 53, et seq.; and for the treatment, p. 189, et seq.

CONGESTIO—CONGESTION.

Varieties.—1. Active. 2. Passive.

1. Active Congestion.

Synonyms.—Arterial Congestion. Sthenic Hyperæmia. Active Hyperæmia.

Characters.—Active congestion consists in a local fulness of the small vessels, analogous to that general fulness of the vessels of the entire body which constitutes plethora. This fulness of the small vessels is accompanied by a more rapid flow of blood through them, and is marked by the same florid redness which is present in inflammation. This state of congestion, indeed, is the forerunner of inflammation.

TERMINATIONS.—In inflammation. In active hæmorrhage. In Dropsy. In passive congestion.

TREATMENT.—When the congestion threatens to run on into inflammation, the moderate and cautious abstraction of blood from the part by leeches or cupping, a position favourable to the return of blood to the heart, the local application of cold, the use of counter-irritants, and the administration of saline aperients, are indicated.

2. PASSIVE CONGESTION.

SYNONYMS.—Venous congestion. Passive hyperæmia. Asthenic hyperæmia.

CHARACTERS.—An overloaded state of the capillaries and small veins, with a languid circulation of blood through the part, which is of a dusky hue, constitutes the state of passive congestion.

TERMINATIONS.—In active congestion, passing on into inflammation. In oppressed and sluggish function of the part affected. In dropsy. In passive hæmorrhages, leading to chronic ulcers in the extremities.

CAUSES.—Mechanical pressure. Constitutional debility. A position unfavourable to the free return of blood to the heart. Cold. Imperfect action of secreting and excreting organs.

TREATMENT.—Mechanical support. Tonics or stimulants, according to the degree of the existing debility. A position favourable to the free return of blood to the heart. In the case of congestion of the mucous membranes, or of congestion or chronic ulceration of the integuments, the local use of stimulant and astringent applications. Friction. The moderate use of aperient medicines, to relieve the general circulation.

HÆMORRHAGIA—HÆMORRHAGE.

VARIETIES.—*General and Local.* Arterial and venous. Active and passive. Vicarious. Traumatic. Congestive.

Hæmorrhage arising in healthy states of system from strong action of the heart, is called *active* hæmorrhage; that which arises from a weakened state of capillaries is called *passive* hæmorrhage; that which arises from congestion might be termed with equal propriety *congestive* hæmorrhage.

1. ACTIVE HÆMORRHAGE.

CHARACTERS.—A sudden or rapid and abundant discharge of vermilion-coloured blood.

CAUSES.—*Predisposing.* Youth and vigour. Plethora. *Exciting.* All excitements of the circulation by violent muscular exertion, the abuse of spirituous liquors, violent passions and emotions of the mind. The *immediate* cause may be the rupture of a large artery or of an aneurismal sac; active congestion of a mucous surface leading to exudation through the capillary vessels; the laying bare of an artery by ulceration; and severe wounds.

TREATMENT.—The antiphlogistic regimen, as in acute inflammation—abstraction of blood from the arm, nauseating doses of tartar emetic, brisk saline aperients, and low diet. A position unfavourable to the flow of blood towards the seat of the hæmorrhage. Quiet and rest of the part affected. Cool air and cooling drinks. Cold applications. Ice. Styptics. The destruction of the bleeding surface by the use of caustics, strong nitric acid, or the actual cautery. The antiphlogistic portion of the treatment should be omitted in all cases of active hæmorrhage occurring in debilitated constitutions. In these cases, in addition to a proper posture, rest, cool air, and cooling drinks, astringent medicines should be prescribed, such as the mineral acids, especially the sulphuric acid, the preparations of zinc and lead, and vegetable substances containing tannin or gallic acid. In all cases of extreme debility, with great pallor of surface, brought on by excessive hæmorrhage, opium and its preparations in full doses are indicated, either by themselves or in combination with astringent medicines, such as the dilute mineral acids, acetate of lead with excess of acetic acid, tannin, &c.

2. PASSIVE HÆMORRHAGE.

CHARACTERS.—A slow discharge of dark-coloured blood by exudation from mucous membranes and surfaces in a state of passive congestion.

CAUSES.—*Predisposing.* Debility. Old age. *Exciting.* Passive congestion. Mechanical impediments to the return of blood by the veins.

TREATMENT.—The removal of mechanical obstructions to the flow of blood. A favourable position. Rest. Astringent applications. The internal use of tonics or stimulants according to the existing degree of debility.

HYDROPS—DROPSY.

SYNONYM.—Œdema (applied to accumulations of serum of small extent).

VARIETIES.—General or local. Chronic or passive. Inflammatory or acute. Encysted.

Dropsy consists in an effusion of serum, or of serum mixed with flakes of coagulable lymph, or with pus, into the cellular membrane of the extremities, or into cavities lined by serous membranes. The simplest forms of dropsy are those which arise from pressure on the veins, from debility, or from the febrile action attendant upon a common cold. The most common situations of dropsical effusions are the skin of the lower extremities, and the sac of the peritoneum.

Causes of dropsical effusions.—1. Inflammation. 2. Febrile action (as in catarrhal dropsy). 3. Debility. 4. Venous congestion. 5. Organic disease leading to congestion. 6. Organic diseases, leading to an alteration in the constituent principles of the blood; for instance, disease of the kidney.

DIAGNOSIS.—When external, the presence of dropsy is known by the effect of pressure with the point of the finger. The skin *pits*, and does not recover its shape for some time. When the dropsy is internal it is known by the enlargement of the part affected, the disturbance of functions due to its pressure on surrounding parts or organs, and by the sense of fluctuation when the fluid can be set in motion by a sudden slight blow of the finger (as in ascites) or by a rapid change of position as in hydrothorax, the motion being perceived in the one case by the other hand placed on the opposite side of the abdomen, in the other by the ear applied to the part of the chest against which the wave is made to strike.

PROGNOSIS.—When not dependent on organic disease, generally favourable. When dependent on organic disease of long standing, and great severity, unfavourable.

TREATMENT.—*Indications.* I. To remove the cause. II. To diminish the quantity of the dropsical effusion. III. To relieve urgent symptoms by the discharge of the fluid.

I. In inflammatory dropsy and dropsy dependent on febrile action the remedies for inflammation and fever are indicated; in dropsy dependent on debility, tonics or stimulants according to the degree of the debility; in dropsy dependent on venous congestion, moderate depletion to relieve the vessels, and regulated pressure to afford support; in congestive dropsy dependent on organic disease, medicines directed to relieve the disease, which is the source of the congestion; and in dropsy arising from organic disease leading to an alteration in the constituent principles of the blood, a treatment appropriate to the disease in question.

II. The quantity of the dropsical effusion may be diminished by remedies which increase the secretions from the skin, kidneys, and bowels — by sudorifics, diuretics, and purgatives adapted to the existing state of the patient. Among sudorifics, the salines are to be preferred, such as nitrate of potass, Dover's powder, &c.; among diuretics, the salts of potass or soda, in combination with some of the infusions or decoctions given under the head of diuretics; and among purgatives, the saline aperients, the compound jalap powder in doses of from ℈i. to ʒi., and the extract of elaterium in doses of from gr. ¼ to gr. i. The doses and strength of the several remedies must be regulated by the state of the patient, the sudorifics and diuretics belonging to the class of depressants being preferred in inflammatory and febrile dropsy, and in comparatively vigorous states of the system; and sudorifics and diuretics belonging to the class of stimulants in states of debility. The saline purgatives will be more appropriate in the latter form of the disease, the more drastic purgatives in the former. Cardiac, hepatic, and renal dropsy also require modifications of treatment, and remedies adapted to the primary disease. (See the diseases of the Heart, Liver, and Kidney).

III. When dropsical accumulations are carried to such an extent as to interfere mechanically with the functions of surrounding parts, it may be necessary to resort to operations in order to discharge the fluid,—to puncture with the curved needle, in the case of anasarca threatening to discharge itself by vesication, or ulceration of the skin; in ascites by paracentesis abdominis; in hydrothorax by paracentesis thoracis; in hydrocele by tapping, followed by stimulant injections to effect a radical cure.

The various local dropsies will be treated in the following pages under the heads of *ascites*, *anasarca*, *hydrothorax*, *hydrocephalus*, &c.

The strong analogy which exists between the state of the vessels in acute inflammation, in active hæmorrhage, and in inflammatory dropsy, makes the indications for the treatment of the one to be nearly identical with those for the treatment of all the rest, and the same observation applies to chronic inflammation, passive hæmorrhage, and dropsy from debility. The state of the vessels in congestion, too, is the same, whether they pour out blood or serum. The principles of the treatment are the same in either case.

ERYSIPELAS—ST. ANTHONY'S FIRE.

Definition.—An inflammation of the skin, spreading from a single centre over a greater or less extent of surface, and subsiding or disappearing in one part as it extends to another.

Species.—1. Idiopathic erysipelas. 2. Traumatic erysipelas.

IDIOPATHIC ERYSIPELAS.

Symptoms.—The disease sets in with rigors, and other symptoms of pyrexia; with confusion of intellect, and sometimes with delirium or coma. There is nausea, and, in some cases, vomiting; in others diarrhœa; the tongue is moist, and covered with a uniform white fur; and the pulse is frequent, quick, full, and compressible. After a variable interval of a few hours, or of one or two days, a red spot appears upon the skin, from which an efflorescence of a bright scarlet or dusky red colour spreads more or less rapidly, being bounded by a distinct margin elevated slightly above the level of the sound skin, and at length occupying a large extent of surface. The colour disappears under the pressure of the finger, but returns when the pressure is removed. There is considerable swelling, and a peculiar acrid heat of the inflamed parts. As the redness extends, it disappears from, or gradually subsides in, the parts at first occupied. After a longer or shorter time the efflorescence usually terminates in the formation of vesicles of a larger or smaller size, or in desquamation of the cuticle. The fever rarely suffers a marked remission till the eruption has ceased to spread, when, in favourable cases, the patient rapidly regains his appetite and strength. In unfavourable cases, the fever assumes the typhoid character, and the patient sinks comatose or exhausted on or about the tenth day.

TERMINATIONS.—1. Resolution. 2. Vesication and desquamation of the cuticle. 3. Œdema (*erysipelas œdematodes*). 4. Inflammation of cellular membrane (*erysipelas phlegmonodes*), with consequent suppuration, or gangrene (*erysipelas gangrænosum*). 5. Metastasis to internal organs, especially to their serous investments. 6. The disease sometimes suddenly leaves one part of the surface, and attacks a distant part (*erysipelas erraticum*).

Parts affected by the disease.—The face is the most common seat of idiopathic erysipelas. It is also of frequent occurrence on the lower extremities. That which follows wounds (traumatic erysipelas) may occur on any part of the body.

Erysipelas of the face (*erysipelas faciei*) commonly begins on the nose, and thence gradually extends over the entire face, causing great swelling of the nose and eyelids, and, in extreme cases, giving rise to great distortion of the features. Sometimes it descends and spreads over the neck and trunk, but more commonly attacks the scalp. In its passage over the head, the membranes of the brain are often more or less affected, and there is acute headache, accompanied sometimes by delirium of the violent or muttering kind, according as the accompanying fever is of the inflammatory or typhoid type; and occasionally terminating in coma. From the head it generally extends down the back, and sometimes affects the membranes of the spinal cord. In severe cases, traces of the affection of the membranes of the brain and spinal cord remain for some time after the recovery of the patient, and are shown by mental excitement, and by numbness and spasmodic twitchings of the extremities. Erysipelas of the head and face is generally accompanied by more or less inflammation and redness of the throat, and in rare instances it proves fatal by inducing serous effusion into the submucous tissue of the glottis and epiglottis.

CAUSES.—*Predisposing.* A full plethoric habit; constitutional peculiarity; previous affections of the same nature.

Exciting.—Cold; excessive heat, or vicissitudes of temperature; exposure to the rays of the sun; abuse of fermented liquors; suppressed evacuations; the presence of irritating matter in the primæ viæ; contagion; wounds or local inflammation of the common kind occurring in certain constitutions, in certain seasons, and in places where the disease already exists. It is often epidemic, most prevalent during spring and autumn, and frequently prevails in hospitals, gaols, and other crowded situations. It is also a frequent concomitant of puerperal fever.

PROGNOSIS.—*Favourable.* The fever purely inflammatory; the eruption of a bright scarlet or red colour; not extending over a large surface; no vesications: the febrile symptoms diminishing upon the appearance of the efflorescence; and this, soon after, assuming a yellowish hue, with an abatement of the swelling.

Unfavourable.—The fever assuming the typhoid form; the inflammation becoming of a dark rose-colour; its suddenly receding from the surface, and attacking an internal part; its extending over a large surface without leaving the part it originally occupied; livid vesications; weak, rapid, irregular pulse; great prostration of strength; early coming on of coma: the disease being epidemic; the constitution of the patient originally weak, or emaciated by previous illness; the disease being combined with dropsy, jaundice, or other affections originating in organic disease.

TREATMENT.—*Indications.* I. To reduce the arterial action, if the fever be of the inflammatory kind.

II. To support the strength of the patient, if it assume the typhoid form.

III. To obviate the tendency to a determination to the head or other important organs.

IV. To subdue inflammation, and promote salutary changes in the part affected.

I. High action, if present, is to be reduced.

(*a*) By *bleeding.*—This operation is, however, to be adopted with the greatest care, for it seldom happens that the fever is purely inflammatory. When, however, the subject is young, in the country, the constitution unimpaired, and the symptomatic fever high, the lancet may be resorted to with advantage; on the other hand, in persons accustomed to the air and living of a large town, and more especially if the constitution has suffered, or is naturally weak, the abstraction of blood is contraindicated.

(*b*) By mercurial and saline aperients. In robust habits, five grains of calomel and five grains of extract of colocynth, followed by the black dose, may be administered from time to time; in other cases from three to five grains of blue pill, with the same quantity of extract of colocynth, followed by a saline aperient, may be substituted for the stronger medicine.

(*c*) By the application of leeches, where general bloodletting is not required.

(*d*) By nauseating *diaphoretics:* especially tartarized antimony.

(*e*) By cooling drinks and *diluents:* as acidulated soda-water, lemonade, tamarind-water, and the like.

(*f*) By a milk, or farinaceous diet, confinement to the house, or rest in bed.

In ordinary cases of erysipelas faciei, where the symptoms do not run very high, the following saline aperient may be prescribed.

℞. Vin. Antim. Pot. Tart. ♏xx. to ʒss.
Magnesiæ Carbonatis, gr. x.
Magnesiæ Sulphatis, ʒi.
Aquæ Cinnamomi, ℥ss.
Aquæ ℥i. M. fiat Haustus.

To be taken two, three, or four times a-day.

If an aperient is not required, the following may be substituted:—

℞. Vin. Ant. Pot. Tart. ♏xx. to ʒss.
Liq. Ammon. Acetat. f ℥ss.
Aquæ f ℥i. M. f. Haustus.

II. *To support the strength of the patient, if the disease assume the typhoid character*, recourse must be had to the remedies recommended in typhus—viz., stimulants, as wine and ammonia, and to the stronger stimulants in persons previously accustomed to their use. These may be combined with opium, which is often found very serviceable, even when the brain is affected.

When the strength is not greatly impaired, and a tonic treatment is indicated, bark may be given with advantage.

℞. Decoct. Cinchonæ, f ʒvii. or f ʒxi.
Tinct. Cinchonæ, f ʒi. M. f. Haustus.

To be given three or four times a-day.

When a stronger stimulus is needed, we may prescribe the following:—

℞. Ammoniæ sesquicarb. gr. v. vel x.
Tinct. Camphoræ f. ℥i. M. f Haustus.

To be given every three, four, or six hours.

When the patient is very restless, tincture of opium may be combined with the foregoing, in doses of from ♏v. to ♏x. or more. But the effect of the opium should be carefully watched.

The treatment of erysipelas will vary, therefore, according to the type of the fever with which it is attended. If it be inflammatory, which it seldom is, the usual means of diminishing inflammation are to be resorted to. If, on the contrary, it assume the typhoid character, quinine, Peruvian bark, wine, and stimulants are to be relied on. If the patient is seen in an early stage, an emetic should be given and followed by a brisk purgative.

III. In cases of head affection with coma and delirium, much relief will be afforded by the application of sinapisms to the feet, mustard pediluvia, or a blister between the shoulders. Diseases of other internal organs must be treated by the remedies applicable to similar idiopathic diseases, taking into account the patient's strength. When the eruption has disappeared from the surface, and attacked an internal part by *metastasis*, an attempt must be made to restore the inflammation of the skin by the prompt application of strong stimulants, as mustard poultices, acetum cantharidis, or hot water.

IV. The topical applications resorted to by surgeons are various.

1. Warm fomentations, such as a warm decoction of poppyheads.
2. Cold spirituous applications where the inflammatory action runs high, and they are grateful to the patient.
3. Dry absorbent powders, as starch, meal, chalk, magnesia, and litharge, to defend the part from the air, and to take up any acrimonious fluid that may be oozing out.

In phlegmonous erysipelas, the vessels may be relieved by leeches, by small punctures, or by moderate incisions. When gangrene has taken place, deep incisions are necessary, and we must use general and local stimulants, fermenting poultices, the chlorides of lime or soda, &c. Should suppuration occur, the abscess must be opened as soon as fluctuation is perceptible.

REMEDIES.—A strong solution of nitrate of silver applied at a short distance from the margin of the inflamed part, or even over the inflamed surface. Creosote similarly applied.

CHAPTER III.

FEBRES—FEVERS.

GENERA.

Continued Fevers.

I.	Typhus	Epidemic Continued Fever.
II.	Febris Ephemera	Ephemeral Fever.

Intermittent Fever.

Febris Intermittens	Ague.

Remittent Fevers.

I.	Febris Remittens	Marsh Remittent.
II.	Typhus Icterodes	Yellow Fever.

CONTINUED FEVERS.

General observations on Continued Fevers.

Continued fevers are distinguished from the febrile state or condition, which attends upon a vast variety of local inflammations and diseases, by the circumstance that continued fevers, properly so called, are at their outset (and often during their entire course), free from local complication; while the febrile state, or condition attendant upon local causes, coincides with, or follows quickly upon, the signs of local disease.

Continued fevers are distinguished from the febrile exanthemata either by the absence of any eruption on the skin during the whole course of the disease, or, in the case of eruptive continued fever, by the rash appearing at a later period after the first febrile symptoms than in any of the febrile exanthemata, as well as by the peculiar situation, character, and course of the eruption. Continued fevers are further distinguished from each other by their duration and severity; the situation and circumstances in which they occur, and the causes which give rise to them. One class of continued fevers occurs, with cases of well-marked intermittent and remittent fever, in hot climates where such forms of fever are endemic. Such cases of continued fever are known as marsh, paludal, or malarious continued fevers. Another class of continued fevers occurs chiefly in large towns, and in the rural districts of temperate climates, and they owe their origin not to local causes, but to contagion, though local causes strongly predispose to attacks of them, and possibly, in extreme cases, give rise to them *de novo*. This contagious, or infectious continued fever varies greatly in different epidemics; and even in the same epidemic presents such differences in character as would seem fully to justify the recognition of at least three varieties, viz., typhoid fever, typhus fever, and relapsing fever, of which the last seems to bear the same sort of relation to the common forms of infectious continued fever, as continued fevers, occurring contemporaneously with the intermittent and remittent fevers of hot climates, do to those more common forms of fever. But these differences between different cases of infectious continued fever are not such as to materially affect the treatment to be adopted; they are, therefore, of little practical moment, and do not seem to justify any departure from the plan adopted in the last edition of this work, of treating continued fever under the single heading of TYPHUS, or EPIDEMIC CONTINUED FEVER.

In this, as in the last edition, the division of Continued Fever into SYNOCHA, or INFLAMMATORY FEVER, TYPHUS, or NERVOUS or PUTRID FEVER, and SYNOCHUS, or MIXED FEVER, is also discontinued, as having no practical value, and the one epithet TYPHUS, with the single synonym EPIDEMIC CONTINUED FEVER, is alone retained. As, however, the terms synocha, synochus, and typhus, have not yet quite fallen into disuse, it is deemed expedient to subjoin Cullen's definitions of these three forms of fever:—

SYNOCHA.—The heat greatly increased; the pulse, frequent, full, and hard; the urine high-coloured; the functions of the sensorium little disturbed.

TYPHUS.—A contagious disease. The heat sometimes little increased; the pulse small, weak, and generally frequent; the character of the urine little changed; the functions of the sensorium greatly disturbed; the strength much reduced.

SYNOCHUS.—A contagious disease. The fever compounded of synocha and typhus; of synocha at the onset, of typhus in its more advanced stages.

These distinctions are not without foundation in the nature of things. There is a *synocha*, a *typhus*, and a *synochus*; that is to say, there is a form of continued fever with high action, and a tendency to *acute local inflammations*; a form of fever with low action, and a tendency to *local congestions*; and a third form, beginning with high action, and ending in low action. But all these forms have been observed in the same city, among the same class of persons, in different epidemics of essentially the same contagious malady. In the same epidemic, too, it would not be difficult to select cases of continued fever belonging to each of the three classes, together with milder cases of very short continuance, and slight severity, differing little from ephemeral fever.

For the reasons now assigned, the single heading of TYPHUS, or EPIDEMIC CONTINUED FEVER, is retained as sufficient for every practical purpose.

TYPHUS—EPIDEMIC CONTINUED FEVER.

SYNONYMS AND VARIETIES.—When named from its prevailing character—SYNOCHA, or INFLAMMATORY FEVER; TYPHUS, NERVOUS, or PUTRID FEVER; SYNOCHUS, or MIXED FEVER; LOW TYPHOID, ATAXIC, or ADYNAMIC FEVER; RELAPSING FEVER; when named after its leading complications in particular epidemics—BILIOUS; MUCOUS; GASTRIC; ENTERIC; GASTRO-ENTERITIC; MUCO-ENTERIC; DOTHINENTERITIS; BRAIN FEVER: when named after its most common external character—ERUPTIVE FEVER; PETECHIAL, MACULATED, or SPOTTED FEVER: when named after its presumed cause—CONTAGIOUS, or INFECTIOUS FEVER; MARSH, PALUDAL, or MALARIOUS FEVER: when named after its duration—FIVE, SEVEN, or TWENTY-ONE DAY FEVER: when named after the places in which it most commonly prevails—PRISON, GAOL, CAMP, SHIP, and HOSPITAL FEVER; and PARISH INFECTION.

DEFINITION.—A contagious or infectious fever, of several days or weeks' continuance, without well-marked remissions, accompanied by extreme prostration of strength, great disturbance of all the bodily and mental functions, and a strong tendency to local complications; and characterised, in most instances, at an early period of the fever, by a peculiar eruption on the skin.

SYMPTOMS.—The onset of continued fever is either sudden and well-marked, or gradual and obscure.

In the first case, the disease is generally ushered in by a succession of severe shivering fits, followed by acute pain in the head, aching in the back and limbs, a sense of lassitude and weariness, an unsteady gait, and a disinclination to exertion, whether of mind or body. The surface of the body is cold and pale, the skin contracted, and the pulse is either small and weak, or full, quick, and very compressible. In some instances the countenance assumes a dull, anxious, and confused expression; and the appetite fails: in some cases there is nausea, in others vomiting, in others diarrhœa. The tongue is covered with a thin white fur. The patient's appearance closely resembles that of a man in a state of intoxication.

In the second case, the symptoms are often so obscure that it is not easy to determine whether the patient is suffering from some slight disorder of the digestive organs, from an attack of common cold, or from the first stage of continued fever. There are no well-marked rigors, and no severe pains in the head, back, or limbs; but the patient is pale, languid, weary, and drowsy, disinclined to exertion, and incapable of applying himself to business. The appetite fails, the tongue is covered with a thin white fur, the bowels are either relaxed or obstinately confined, the pulse somewhat increased in frequency. The patient passes restless nights, and wakes unrefreshed. This period of uncertainty may last three or four days, and the transition to a state of undoubted fever may be so gradual that it may be altogether impossible to fix on any precise time at which the disease may be said to have been first present. The history of the case by revealing the fact of an exposure of the patient to the contagion of fever is often the best aid to a just diagnosis.

This premonitory stage of fever, whether the onset be sudden or gradual, passes more or less rapidly into fully-developed continued fever, marked by pungent heat of skin, increased frequency of pulse, with thirst, headache, throbbing of the temples, flushing of the face, suffusion of the eyes, and great restlessness and irritability. The patient's countenance expresses indifference and confusion of mind. He answers questions slowly, and as if with difficulty, but rationally. There is great prostration of strength, the patient lying on his back, and being unable to rise without assistance. He sleeps little, his sleep is disturbed by dreams, and he wakes unrefreshed. The tongue, which is at first clean and smooth, or covered with a white fur, or marked with a dry brown streak along, or on each side of, the middle line, becomes uniformly covered with a dry brown fur.

During this early stage of the fever some indications of local disease generally show themselves. Diarrhœa sometimes sets in, the evacuations being usually of the colour of yellow ochre, or of a darker colour, and very offensive. There is some uneasiness on pressure, especially in the right iliac fossa, which is also somewhat tympanitic, and gives to the hand the impression of containing fluid mixed with air. The presence of some degree of congestion of the lungs is also indicated by increased frequency of respiration, and by diffused mucous râle and slight sibilus, heard on applying the ear or stethoscope to the chest. The disturbance of the circulation through the brain, and the altered condition of the blood, are also evidenced by the symptoms just enumerated. In rare instances, even during this early stage, the urine is suppressed, and requires to be drawn off by the catheter. In other instances it is merely scanty, high-coloured, and offensive to the smell. During the second stage, and commonly from the fourth or fifth to the seventh day, a peculiar eruption appears on the skin of the abdomen and chest. After the patient has remained in this state for a week or ten days, he either shows signs of amendment, and gradually recovers, or he sinks into the condition familiarly known as the *typhoid state*.

In this typhoid state all the symptoms of debility are more marked. The patient lies helplessly on his back, with his mouth open, and sinks towards the foot of the bed; his voice is scarcely audible; he swallows with great difficulty; the tongue is protruded tremblingly, and as if with hesitation; there are also tremblings and catchings of the hands and limbs; the patient is delirious, and either talks loudly and incessantly, and makes constant efforts to get out of bed, or mutters indistinctly to himself. From this state the patient may generally be roused by addressing him in a loud tone of voice, when he will converse rationally for a time, and answer questions, but soon relapses. Deafness and indistinctness of vision are often present, or black spots appear before the eyes, which the patient attempts to grasp; hence the picking at the bed-clothes. The pulse becomes very frequent, weak, and compressible, perhaps unequal and irregular; the dry brown tongue becomes black; dark sordes accumulate on the teeth and lips; bed sores form on the hips and sacrum; the fæces pass involuntarily; the urine is retained or dribbles away unconsciously; the abdomen is tympanitic, and when firmly pressed shows itself by the countenance of the patient to be the seat of pain. The evacuations from the bowels which are usually of a yellow-ochre colour, and of the consistence of thin pea-soup, at length become tinged with blood, or contain large quantities of that fluid; and blood is effused under the skin, in smaller or larger quantities, in round spots known as *petechiæ*, or in large irregular blotches. From this typhoid state the patient either recovers by a gradual amendment of all the symptoms, or after some profuse and *critical* discharge, of which that by the skin is the most common; or he sinks more or less rapidly, and dies comatose; or in consequence of increased difficulty of breathing, as evidenced by the death-rattles; or from simple exhaustion of all the powers.

SECONDARY AFFECTIONS.—*Head affections.*—These consist in inflammation or congestion of the membranes of the brain, and more rarely of its substance. This congested state of the vessels of the brain occurs more or less in all cases of typhus fever in this country. It is indicated by dingy redness of the skin of the face, increased heat of the integuments of the face and scalp, and minute injection of the conjunctiva of the eyes with dark blood, an extreme degree of stupor, constant muttering delirium, increased frequency with great feebleness of pulse, irregular distribution of heat over the surface of the body, and a dark, dry, furred tongue, protruded with difficulty, and slowly withdrawn. When the condition of the brain is rather that of inflammation than of congestion, there is great heat of the face and scalp, intolerance of light and sound, and the delirium, instead of being of the low muttering kind, is characterised by loud talking and constant efforts to get out of bed; and the patient, if not narrowly watched and forcibly restrained, will sometimes effect his escape from his attendants.

Chest affections.—*Catarrhal symptoms* often occur very early in the disease, arising from the same state of congestion of the vessels of the air-passages which exists in the membranes of the brain. This complication is indicated by cough, at first dry, and afterwards accompanied with clear mucous expectoration: there is slight dyspnœa, and the ear detects the mucous rhonchus. This affection, though of frequent occurrence in some epidemics, is rarely attended with much danger, and in favourable cases is soon and easily subdued. *Pneumonia* and *pleurisy* may also occur as secondary affections. Their symptoms are apt to be masked by the torpor of the senses and of the mind, which renders the patient insensible to pain. The stethoscopic signs are the same as in idiopathic affections of the same kind. Aphthous ulceration of the mouth and throat, cynanche tonsillaris, cynanche laryngea, and cynanche parotidea, are of occasional occurrence: the latter may often be regarded as a favourable symptom.

Affections of the abdomen: Gastritis.—Patients are often affected towards the end of the first and beginning of the second week, with nausea and vomiting, with pain and tenderness in the epigastrium. These symptoms differ in no respect from those of idiopathic gastritis, except that the patient does not complain of pain, which is only made apparent by deep pressure. When it is complicated with severe head-affection, it is necessary to watch the expression of the patient's countenance during the pressure, as this will often betray uneasiness when he does not complain of pain.—*Enteritis.* This affection is indicated by distention and firmness of the abdomen, pain and tenderness on pressure, and yellow diarrhœa. This latter symptom, however, is not always present. The same remark applies to the tenderness in enteritis as in gastritis, and the same means must be used to ascertain its existence. The inflammation, when it occurs, may assume the common form of idiopathic inflammation, or may consist in a peculiar affection of the glands of the intestines, presently to be noticed. Perforation of the intestines sometimes occurs. *Hepatic disorder*, accompanied by jaundice, is another complication. All the other viscera of the abdomen are subject to occasional congestion or inflammation.

The Skin.—The skin is the seat of several secondary affections in typhus fever. The following forms have been recognised: 1. Small spots closely resembling freckles; met with only in advanced stages of fever, a short time before death. 2. Small roundish spots of a dingy-red colour, often closely crowded together, without perceptible elevation of the skin, and closely resembling flea-bites, but without the dark point in the centre. Their usual seat is the head, shoulders, forearms, and legs. They generally make their appearance towards the close of the first or beginning of the second week. 3. Irregular spots of a rose-red tint, slightly elevated above the skin, becoming paler but not being removed by pressure, presenting some resemblance to the eruption of measles, and occasionally difficult to distinguish from it. They are scattered more or less profusely over the trunk and extremities, and they often exist on the abdomen when they are not to be found elsewhere. They occur in some epidemics with much regularity on the fourth day; in others, on the seventh, and continue for a period varying from one or two days to a fortnight. These spots are peculiar to typhus. *Petechiæ*, in the ordinary sense of the term, are also of frequent occurrence in continued fever, occurring sometimes early in the disease, but more commonly towards the close of it, and where debility is extreme. The size of the spots varies from that of a pin's head to that of a crown-piece. Sometimes the effusion of blood under the skin is more abundant, and the spots assume the form of large blotches or bruises. *Sudamina*, in the form of small transparent vesicles are also of not infrequent occurrence, and in some epidemics have been invariably present. They are generally found on the chest, neck, and arm-pits. *Erysipelas* is apt to occur as a secondary affection when idiopathic erysipelas is prevalent. *Gangrene* and *sloughing*, preceded by erythema of the skin, are common occurrences in the advanced stage of the disease, in parts submitted to pressure.

Anatomical characters.—In the *mucous membrane of the intestines*, inflammation and its consequences, and inflammation and ulceration of the clustered glands of the intestines (*glandulæ agminatæ*, Peyer's glands), occupying, for the most part, the ileum near its termination in the cæcum, and more rarely of the solitary glands. This disease assumes various forms,—as the soft, the hard, the granular, the pustular, the ulcerous, and the gangrenous. These morbid appearances are sometimes accompanied by inflammation of the mesenteric glands. Softening of the parenchymatous substance of all the organs —the brain, the heart, the liver, the spleen, the kidneys, &c.; softening and ulceration of the mucous membranes lining the alimentary canal, and leading sometimes to perforation; congestion, or inflammation of the substance of the lungs; pulmonary hepatisation in its several stages; inflammation or congestion of the membranes of the brain, of the pleura, peritoneum, &c.; the several appearances of the skin already described; to which may be added a want of cohesion of the blood itself.

SEQUELÆ.—*Relapses* are of frequent occurrence in fever. They are brought on by want of care, by premature exposure to cold, by unsuitable diet, or by a premature resumption of business. In some epidemics the tendency to a relapse is much stronger than others; and this tendency has been sometimes so remarkable as to lead to the designation, relapsing fever. *Œdema* is a common consequence of the debility of the capillary vessels. It soon disappears with returning strength. Perforation of the bowels, characterised by a sudden and acute pain in the abdomen, is among the sequelæ of continued fever. Rheumatism, neuralgia, a swelling of the leg resembling phlegmasia dolens, phthisis pulmonalis, mania, and various local inflammations, are among the more remote sequelæ.

VARIETIES.—Each epidemic of fever differs somewhat from another. In some epidemics the symptoms are inflammatory, and blood-letting is indicated; in others typhoid, and stimulants are the appropriate remedies. In one epidemic the brain suffers most, in another the mucous membrane of the intestines, in a third the lungs, in a fourth the liver. In some instances the pulse, which is usually increased in frequency, has been uniformly below the standard in health. In some epidemics, *petechiæ* have been almost uniformly present, in others *sudamina*. Some epidemics have been characterised by a tendency to hæmorrhages, others by the early and general appearance of bed-sores. The duration of the disease has also been very different in different epidemics; the majority of cases terminating on the fifth or seventh day, or at the end of the second, third, or fourth week. The severity of the disease has also varied in a very remarkable manner.

There is also reason to believe that in the same season and place, two or more types of fever may coexist, marked by very characteristic differences, and each confined to certain subdistricts. We owe the proof of this fact to Dr. W. Jenner, who distinguishes the two leading varieties as TYPHUS and TYPHOID.

Typhus fever attacks persons of the mean age of nearly 42 years; in typhoid fever the mean age is 22 years. In typhus fever relapses do not recur; in typhoid fever they are very frequent. In typhus fever, Peyer's glands escape; in typhoid fever they are diseased. The eruption of typhus fever appears from the fifth to the eighth day; that of typhoid fever from the seventh to the fourteenth. In typhus fever the spots continue till the death or recovery of the patient; in typhoid fever each spot lasts about three days. In typhus fever no fresh spots appear after the second or third day of the eruption; in typhoid fever fresh spots appear every day or two during the whole course of the disease. The eruption in typhus fever consists of dusky pink spots of irregular outline, which in two or three days deepen in colour, fading, but not being removed by pressure; and in some instances being dark-purple in the centre, unchanged by pressure, and passing into petechiæ. The spots are very numerous, and are usually found on the trunk and extremities, but sometimes only on the trunk. In typhoid fever, the patches are circular, of a bright rose colour, papular, slightly raised, but not pointed; disappearing entirely on pressure, and reappearing when the pressure is removed; few in number (from six to twenty at a time), and generally occupying the abdomen, thorax, and back.

CAUSES.—*Predisposing.*—Weak and delicate habit of body, accompanied by much sensibility and irritability; all causes which impair the strength, such as over-exertion of mind or body, sedentary habits, depressing passions of the mind, poor living, dissipation, and intemperance; warm climates; cold and wet seasons; filth and over-crowding; family or hereditary peculiarity. But the strongest and most robust persons are by no means free from attacks of fever. Damp houses situated in wet and rich soils.

Exciting.—Contagion. Filth and over-crowding (as in thickly-inhabited houses placed over foul cesspools, or badly-constructed drains):

Proximate or Essential.—Some observers, as those of Paris, witnessing epidemics in which gastro-intestinal irritation exists in the majority of cases during life, and a peculiar affection of the glands of the intestines after death, have regarded this state of the intestinal canal as the essential cause of fever; hence the theory of Broussais: others, again, in our own country, having observed cerebral complications in the majority of cases, have assumed them to be the cause. There is no real ground for these theories, and the majority of medical men are now convinced of their fallacy. There is every reason to anticipate an unanimity of opinion on this subject, as all the best and most recent authorities agree in representing fever as a disease *sui generis*, liable to be complicated with, but not caused by, local affections.

A disease resembling true typhus may be produced by other causes besides contagion. Thus, local inflammation occurring in broken constitutions sometimes produces general febrile symptoms, allied in character to those of typhus. The febrile symptoms which accompany pneumonia sometimes take the same shape, and severe and long-continued inflammation of the mucous membrane of the intestines, in rare instances, takes on the same character. So also does obstinate obstruction of the bowels, especially when complicated with inflammation. Typhoid symptoms may also supervene on all deep-seated inflammations, on severe burns, wounds, fractures, phlebitis, dissection wounds, local injuries, and eruptive fevers. The history of the case, however, will generally suffice to distinguish idiopathic fevers of all kinds from the effects of local inflammations; for in the former the febrile symptoms precede the local affections, while in the latter the local affections precede, or occur at the same time with, the febrile disorder.

Laws of Infection.—1. All the forms of continued fever are communicable, and probably in an equal degree, and communicable to all constitutions, though after very variable periods of exposure. 2. The infection is by no means virulent, requiring, in most cases, concentration of the infection itself, and long exposure to it; but it operates with greatest certainty on persons of weak constitution, on those who have been enfeebled by cold, privation, fatigue, or excess, and where cleanliness and ventilation are neglected. 3. Fever is most rife in damp and ill-drained spots, and wherever organic matter (especially vegetable matter) is in a state of decay. 4. The liability to fever is nearly equal in the two sexes; it increases up to about twenty years of age, and from that period diminishes as life advances. 5. One attack of fever is, in some measure, a protection against future ones: (Dr. Tweedie, physician to the London Fever Hospital, has had it three times, and Dr. Christison, of Edinburgh, six times). 6. The existence of other febrile or inflammatory diseases acts as a protection as long as they last, but they probably leave behind them a greater susceptibility. It seems probable that fomites (substances by which infectious effluvia are absorbed) do not contribute much to the propagation of fever, and that infection is not retained by them long.

[These laws of infection are adopted, with alterations and corrections, from Dr. Christison's summary in the Library of Practical Medicine, Vol. I., p. 158.]

STATISTICS OF FEVER.—*Influence of age on the prevalence of the disease.*—From 5 to 10 years, 1 in 134 of the population living at that age; from 10 to 15, 1 in 66; from 15 to 20, 1 in 41; from 20 to 30, 1 in 53; from 30 to 40, 1 in 85; from 40 to 50, 1 in 140; from 50 to 60, 1 in 271; and above 60, 1 in 929. The chance of seizure between 15 and 20 being represented by 100, it becomes, in round numbers, between 5 and 10, 31; between 10 and 15, 62; between 20 and 30, 78; between 30 and 40, 49; between 40 and 50, 29; between 50 and 60, 15; and above 60, 4½. (From data supplied by Dr. Cowan, for the epidemic of Glasgow in 1836.) *Influence of Sex.*—Males, 49·5 per cent.; females, 50·5 per cent. (Glasgow epidemic). Males, 43 per cent.; females, 57 per cent. (Edinburgh epidemic of 1819). It must be borne in mind, that females are always in excess of males, and that they are more employed about the sick. When this is taken into account, the influence of sex will appear inconsiderable.

MORTALITY OF FEVER.—In the Edinburgh epidemic of 1817-20, which presented the inflammatory character (synocha), the mortality was 1 in 22, 1 in 25, or 1 in 30; but in the recent epidemics of Edinburgh, which have assumed more and more of the typhoid or adynamic character, the mortality has been 1 in 10·33 (epidemic of 1826-7); 1 in 10 (epidemic of 1837); and 1 in 6·27 (epidemic of 1838). The following is the mortality observed in various epidemics in this climate: in Edinburgh, from the year 1817 to 1838, the mortality ranged from 1 in 30 to 1 in 6·27; in Glasgow, in the epidemic of 1835-37, from 1 in 15 to 1 in 10; in Manchester, from 1818 to 1828, from 1 in 11·75 to 1 in 6·66, the average mortality for the whole period being 1 in 8·25; in the London Fever Hospital, during the same number of years, from 1 in 10 to 1 in 5, the average of the whole period being 1 in 6·50. In the year 1816, according to Dr. Marcet, one-fourth of all the fever cases admitted into Guy's Hospital died; whilst one-half of all the seizures proved fatal in Dr. Willan's experience at the Carey-street Dispensary. In the Parisian fever, complicated with gastro-enteritic affection, the mortality, according to Louis, has been as high as 1 in 2·9.

Mortality at different ages.—In the Edinburgh epidemic of 1818-20, in which the mortality was 1 in 22 for all ages, the deaths under 20 were 1 in 65; between 20 and 30, 1 in 29; between 30 and 40, 1 in 18; between 40 and 50, 1 in 11·4; and between 50 and 60, 1 in 6.

These numbers represent the general rule, but this rule is liable to exception: thus, in the London Fever Hospital, during the years 1828-29, when the general mortality of the hospital was 1 in 7·22, that for children under 15 was as high as 1 in 7·33; between 15 and 30, 1 in 9·5; between 30 and 50, 1 in 7·33; and above 50, 1 in 2·5.

Mortality in the two sexes.—According to the tables of Dr. Cowan of Glasgow, founded on an examination of 2,259 patients, the deaths for all ages amount to 1 in 6·75 among the males, and only 1 in 11·2 among the females; below puberty the proportion is 1 in 25 for boys, and 1 in 28 for girls. Dr. Welsh's tables, formed from 743 patients, observed in the Edinburgh epidemic of 1817-20, give 1 in 16 for males, and 1 in 30 for females; under 20 years of age the mortality for both sexes was 1 in 68; above 20, for men, 1 in 11, for women, 1 in 24. This disparity after 20 is ascribed by Dr. Christison, and with apparent justice, to the greater prevalence of intemperance among men.

Duration of continued fever.—From tables contained in Dr. Davidson's Thackeray Prize Essay, it appears that the duration of synocha (by him named febricula), in 30 cases, was from 3 to 10 days, the average being 8 days for males and females; whilst the duration of eruptive typhus, calculated from 181 cases, was 19·7 days for males and 21·3 days for females, the average for the two sexes being 20½ days. The least duration in males was 12 days, the greatest 29 days; in females, the least duration was 13 days, the greatest 54 days. The duration of the disease is calculated from its commencement to the establishment of complete convalescence.

PERIOD OF INCUBATION.—From 7 to 72 days (Haygarth). From 13 to 68 days (Bancroft). From 10 to 18 days (Sir W. Burnett): 10 days on the average (Dr. Gregory.)

Critical days.—The ancient doctrine that favourable cases of fever have a decided tendency to terminate on certain days, called critical days, has lately been confirmed by the observations of Dr. Welsh in the Edinburgh epidemic of 1819. The critical days are 3, 5, 7, 9, 11, 14, 17, 20; the non-critical are the intervening days, with the exception of the 4th and 6th, which are considered as secondary critical days. Of 690 cases, a crisis took place in 470 on critical days, in 52 on the secondary days, and in 108 on non-critical days. The cases included all the forms of fever.

DIAGNOSIS.—From idiopathic local diseases, by the history of the symptoms, and the want of correspondence between the severe general disturbance and the comparatively slight local affections. Also, in the majority of cases, by the presence of the peculiar eruption on the skin. From severe cases of catarrh and influenza, by the absence of the herpetic eruption on the lips and chin, which often characterise those diseases.

PROGNOSIS.—*Favourable*:—the absence of local complication; the debility not extreme; the tongue still moist, or not greatly coated; the pulse steady and compressible, and not very frequent; the respiration infrequent; the skin of moderate and uniform temperature; the countenance clear and not flushed; the eye uninjected; the posture approaching to that assumed by healthy persons; the absence of delirium and stupor: to these must be added youth. About the fifth, seventh, fourteenth, or twenty-first day, the tongue peeling and becoming moist, first at its edges, afterwards on its surface; a moisture breaking out upon the skin; a gentle diarrhœa; the pulse becoming fuller and more slow; the cessation of delirium, with some return of sleep and appetite; the appearance of aphthæ, of scabby eruptions about the mouth, or of phlegmonous tumours in different parts of the body; the urine increasing in quantity, and depositing a sediment.

Unfavourable. An advanced age; the existence of severe local disease; extreme debility; dry, brown, coated tongue; frequent, small, and irregular pulse; skin universally hot, or the temperature unequally distributed; the countenance muddy; the eyes suffused; extreme anxiety and restlessness; decubitus on the back, the body falling towards the foot of the bed; low, muttering delirium; stupor; subsultus tendinum; picking at the bed-clothes; involuntary evacuations; retention of urine; tympanites; petechiæ; gangrene and sloughing of the back and sacrum. In estimating the importance of these symptoms, whether favourable or unfavourable, the character and tendency of the existing epidemic, and of other diseases prevailing at the time, must be borne in mind. It must also be understood that these symptoms, though unfavourable, are not such as to preclude all hope of recovery.

TREATMENT.—Continued fever can only be effectually treated on general principles, applied to individual cases, with due regard to the character of the existing epidemic, the peculiarity of the patient's constitution, and the period of the disease. Experience has proved that there is no stage of the disease at which remedies will prove effectual in cutting it short, and that it will run a certain course, and endure for a certain period, in spite of remedies. In every stage of the disease, and in every part of the treatment, therefore, the practitioner must bear this fact in mind. If, in the early stage, the disease appears to call for prompt antiphlogistic treatment, it must be recollected that a period of depression is at hand, and that that depression will be increased by undue activity in the early stage. On the other hand, it must not be forgotten that local complications are apt to occur in the course of the fever, which may be aggravated by a neglect of proper antiphlogistic measures during the period of reaction. Moderation in the use of remedies, constant watchfulness, and early and prompt attention to symptoms of local complication, are peculiarly necessary in all cases of continued fever. To insure the discovery of local complications, it is essential that the state of the brain, chest, and abdomen, and of the parts on which the patient lies, should be ascertained at every visit by inquiries and examinations directed to those parts. It is especially important that the state of the urinary bladder should be ascertained by examination with the hand, and that, if necessary, the urine should be regularly drawn off.

The treatment of continued fever must vary with the stage of the malady, and will be best considered under the heads of:—1. The incipient period. 2. The period of reaction. 3. The typhoid period; and 4. The period of convalescence.

1. During the incipient period, or, at the outset of the malady, the indications are—(*a.*) To remove from the primæ viæ any matter which, in a later stage of the disease, may become a source of irritation; and (*b.*) To place the patient in the most favourable condition for passing through the remaining stages of the disease.

a. The remedies to be prescribed, with a view of fulfilling the first indication, are emetics and purgatives. The emetic may consist of a grain of tartar-emetic and a scruple of ipecacuanha; the purgative, of castor oil, or the common senna draught; preceded, if the bowels are torpid, by 5 grains of calomel and 5 grains of extract of colocynth, or by any other suitable mercurial preparation, to be repeated if necessary.

b. The second indication is best fulfilled, in the greater number of cases, by abstinence from active treatment; but in very plethoric subjects, or where there are symptoms of cerebral congestion, a moderate abstraction of blood may be necessary. When the pain in the back and loins is extremely acute, the abstraction of blood by cupping to the loins is to be preferred.

2. During the period of *reaction*, which rarely extends beyond the first week, the chief indication is to moderate febrile action by the smallest possible expenditure of strength. For this purpose, antiphlogistic measures may have to be employed, the practitioner being guided in the selection of them by the consideration that a period of debility is at hand. The remedies most efficacious for this purpose are general and local bleeding, followed by tartar-emetic, and the application of cold to the surface. In *bleeding*, should this remedy be deemed indispensable, our object is to produce the greatest possible effect at the smallest cost of blood. The patient, therefore, should be supported in the erect posture, if possible, or he should be raised in bed; a free orifice should be made in the vein, and blood be taken to the approach of syncope. Among the populations of large towns, and even in country places, in the type of fever which now generally prevails, bleeding is decidedly contraindicated. *Tartar-emetic* may be administered with advantage whenever fever is accompanied by high action. It may be given in doses of from one-eighth to one-fourth of a grain every two, three, or four hours, and is advantageously combined with small doses of sulphate and carbonate of magnesia. The patient should be allowed to drink freely of cold water. Where there is much fever, iced-water or ice may be allowed, according to the degree of thirst. *The application of cold to the surface* is only

indicated when the temperature of the surface is above the natural standard, as measured by the touch or by the thermometer, and should be continued no longer than it is agreeable to the patient. The best mode of applying cold is by sponging the entire surface with warm, tepid, or cold water, or with vinegar and water, and allowing it to evaporate until the heat is reduced, and the pulse lowered. When these effects have been produced, or the patient complains of chilliness, the body should be carefully dried with a warm towel. The remedy may be repeated as often as the temperature of the skin rises steadily and uniformly above the natural standard. The head should, at the same time, be shaved and kept cold by cloths dipped in cold lotions, and constantly renewed. In mild cases the hair should be thinned, or cut short, and kept constantly moist with iced-water squeezed out of a sponge.

Complete rest of mind and body, external quiet, cleanliness, and a free supply of pure air, should be strictly enjoined from the first, and during the whole course of the disease.

3. During the *typhoid period*, or that state of continually increasing debility which follows the period of reaction, the indications are—(*a.*) To moderate febrile action. (*b.*) To support the strength of the patient. (*c.*) To subdue local inflammations and congestions, and relieve urgent local symptoms.

a. The first indication is to be fulfilled by cold or tepid sponging to the skin, and cold to the head; by cooling drinks, of which iced-water is the best; and by tartar-emetic in small doses, such as from 15 to 30 drops of the antimonial wine. This treatment may be continued till typhoid symptoms make their appearance, when the second indication will have to be fulfilled.

b. As the patient's strength requires to be economised during the first stage of fever, so does it require to be supported in the last stage. Stimulants must be administered with care and caution, being guided in our selection and in the dose employed by the degree of the existing debility. Where the debility is not extreme, the remedies belonging to the class of tonics, such as quinine, mineral acids, and the infusions of cusparia or serpentaria, may be given. In greater degrees of debility, the diffusible and spirituous stimuli should be preferred, such as ammonia, spirits of sulphuric or nitric æther, wine, or brandy.

Ammonia may be used with great advantage in those cases where some doubt is entertained of the propriety of administering stimuli. Its effects being of short duration, should it be found to raise the pulse or increase the fever, it may be withdrawn, without leaving behind it any permanent bad effects.

When the debility is extreme, and all the typhoid symptoms strongly marked, wine or brandy must be liberally administered, the former to the extent of from half a bottle to one or even two bottles a-day, the latter to the amount of a quarter or half-a-pint, or even more. When the symptoms are less severe, from two to four or six ounces of wine may be given daily. Patients who have previously indulged in habits of intemperance will require to be still more liberally supplied. Beef-tea, thickened with arrow-root, strong animal jellies, and the stronger soups should also be given to the patient in small quantities and at short intervals.*

The choice of stimulants should be determined by the degree of the debility, the amount of febrile action, the presence or absence of local affection, and the character of the pulse. When the pulse is frequent, hard, and quick, stimulants are contraindicated; but when the pulse is frequent, small, and compressible, or infrequent and compressible, stimulants may be given with safety. When stimulants render a frequent pulse less frequent, or but slightly increase the number of an infrequent one, they may be safely administered. In doubtful cases, the practitioner will do well to visit patients labouring under fever soon after the administration of the first dose of the stimulant, or to administer it with his own hands, and ascertain by these simple tests, whether or not the treatment he is adopting is a safe one.

c. In fulfilling the *third indication* (namely, the subduing of local inflammation, and the relief of urgent local symptoms), the necessity of sparing the blood and strength of the patient should be constantly borne in mind. As the *brain* suffers more or less in all cases, it is desirable to guard against inflammation, and to subdue it where present, by having the head shaved, and applying cold water, iced-water, refrigerating lotions, or the ice-cap, according to the severity of the existing symptoms. If the patient suffers from protracted sleeplessness, with extreme restlessness, and a condition allied to delirium tremens, a full dose of some preparation of opium is indicated. (From 20 to 30 drops of laudanum, or from a third to half a grain of the acetate or muriate of morphia.) The dose may be repeated after an interval of from 4 to 6 hours, if attended with marked benefit. It may also be advantageously combined with tartar-emetic in doses of from an eighth to a quarter of a grain. In some cases the opiate is best administered in the form of injection (a drachm of tincture of opium in half a pint of thin gruel). These means may require to be assisted by the application of a few leeches to the temples, or behind the ears, or by cupping to the back of the neck. If *coma* supervene, a blister to the scalp may be prescribed with advantage.

When the stethoscopic signs indicate the presence of *bronchitis* or *pneumonia*, blood may be taken away in small quantities by leeches or the cupping-glass; or, if the symptoms are less severe, a blister or mustard poultice may be applied over the part of the chest most severely affected.

The state of the *bowels* requires to be closely attended to. If they do not act naturally, the hydrargyrum c. cretâ, in doses of from 2 to 5 grains, followed after an interval by a dessert spoonful of castor oil, will generally suffice. *Diarrhœa* is best relieved by a few grains of

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* Chlorate of potash (one drachm in a pint of water) has been recommended as a stimulant drink.

Dover's powder, or by a combination of a single grain of hyd. c. cretâ, with 2 or 3 grains of the soap and opium pill, or of the extract of poppy. If, on pressing the abdomen, tenderness is present either at the pit of the stomach, or in the iliac regions, from 4 to 6 or 8 leeches, followed by a light warm poultice, should be applied to the tender spot. Where the patient is too weak to bear the loss of blood, a large, warm, linseed-meal poultice to the abdomen often gives perceptible relief. Obstinate diarrhœa with tympanites is best relieved by injections of thin gruel with turpentine. In some instances blisters to the abdomen have been productive of great relief to both these symptoms.

Sloughing of the integuments of the hips and back should be guarded against by rubbing any red spots that may make their appearance frequently with brandy or the soap liniment; when the skin is broken, it should be protected by the soap, or *amadou* plaster. The risk of extensive sloughing may be averted by the *water-bed* or the *rheiocline*.

The state of the bladder must be carefully watched, and the urine, if retained, must be drawn off two or three times a-day, the patient being at the same time kept scrupulously clean.

Throughout the disease, the patient should be narrowly watched, so that new local complications may be treated as soon as they arise. It must also be borne in mind, that in consequence of the diminished sensibility of the patient to internal as well as external sensations, inflammation of internal organs may occur, and make some progress before it is discovered. It is, therefore, not to the sensations of the patient, but to the other symptoms and signs of disease, that the medical man must trust for early information of the presence of local complications.

Convalescence requires much care and watching. Two indications are to be fulfilled—to restore the strength, and to guard against relapse. The strength will be best restored by the gradual substitution of nourishment for stimuli, the nourishing quality of the food being increased as the stimuli are withdrawn. When, however, the debility is very great, and, as often happens, there is a constant tendency to fainting, stimulants must be administered frequently and in large doses. In the commencement of convalescence, simple farinaceous diet should be prescribed, or farinaceous diet with milk, then the weaker soups, then fish, boiled or fried, then the boiled or roasted meat of full-grown animals. In the regulation of the diet, the appetite is the best guide, and this should determine both the quality and the quantity of the food.

A foul dry tongue, increased frequency and sharpness of pulse, flushing of the face, and disturbed sleep, are indications that the diet is too large in quantity, or of too nourishing a kind. If the patient is restless, and obtains little sleep, opium or morphia, in combination with a stimulant, may be administered. The cautious regulation of the diet, an avoidance of all violent exertion, and of exposure to cold, will generally prevent a relapse.

PROPHYLAXIS.—Spacious and airy apartments for the sick, complete ventilation, fumigations with chlorine, frequent change of linen, and the prompt removal of excretions, are the chief precautions to prevent the spread of contagion. The attendants on the sick should not be young persons, and they should be selected, if practicable, from such as have already had an attack of fever. During their attendance, their diet should be nourishing, they should avoid excessive fatigue, and be allowed regular exercise in the open air. All unnecessary intercourse of other persons with the sick should be prevented. Rooms which have been occupied by fever patients should be well washed and ventilated, and the ceilings whitewashed. The bedding and furniture should be freely exposed to the air; the bed-clothes and clothes of the patient should be washed, and the stuffing of the pillows and bed should be cleansed in the more severe cases. More careful precautions will scarcely be required in the case of a disease which is proved by experience not to be virulently contagious.

REMEDIES.—Emetics given at the outset, with a view of cutting fever short. Bloodletting, under the supposition that the essence of fever consists in inflammation of the brain, or of some other important organ. Mercurial preparations to the extent of affecting the mouth, with a view of superseding or suspending the febrile action. These remedies, as means of curing fever, have justly fallen into disuse. Quinine in doses of from 5 to 10 grains every two or three hours, given at the outset of the disease, and also in its more advanced stages, in the absence of visceral complication.

FEBRIS EPHEMERA—EPHEMERAL FEVER.

SYNONYM.—Simple Fever.

DEFINITION.—A continued fever, of slight degree and short duration, which often runs its course in twenty-four hours.

SYMPTOMS.—After slight rigors, of short continuance, with nausea, loss of appetite, and feelings of indisposition, increased heat of surface, headache, a frequent pulse, a furred tongue, and slight thirst. These symptoms generally terminate by perspiration.

CAUSES.—Exposure to cold, a meal of unwholesome food, a debauch, over-fatigue. The contagion of typhus fever acting upon a strong constitution, or that of any of the exanthemata acting on a person who has already had the disease once?

Diagnosis.—From severe forms of continued fever by the mildness of the symptoms. Caution, however, is necessary in expressing an opinion, as the first onset of severe cases of continued fever, and of the exanthemata, is often not more strongly marked than a case of ephemeral fever.

Prognosis.—Favourable in proportion to the mildness of the symptoms, but guarded, bearing in mind the fact just stated.

Treatment.—Rest in bed, farinaceous food, and cooling drinks, pure air, and a gentle saline aperient.

℞. Magnes. sulph. ℥ss.
Magnes. carb. gr. x.
Vin. antim. pot. tart. f ʒss.
Aquæ menthæ pip. f ℥ss.
Aquæ puræ f ℥i. M. fiat Haustus.

FEBRIS INTERMITTENS—AGUE.

Synonyms.—Intermittent fever. Fever and ague.

Definition.—A fever consisting of febrile paroxysms, occurring at stated intervals with perfect intermissions. (N.B.—The period between the end of one paroxysm and the beginning of the next, is called the *intermission*; the period occupied by one paroxysm and one intermission is called the *interval*.)

Varieties.—1. The *Quotidian*; a paroxysm once in every 24 hours.

2. The *Tertian*; a paroxysm once in every 48 hours.

3. The *Quartan*; a paroxysm once in every 72 hours.

Other varieties of less importance are, 1. The *double quotidian*, having two paroxysms every day. 2. The *double tertian*, in which a paroxysm occurs every day, those of the alternate days being of equal duration and intensity. 3. The *triple tertian*, in which two paroxysms occur on one day, and only one on the other. 4. The *duplicated tertian*, which returns twice on each alternate day. 5. The *double quartan*, in which a paroxysm occurs on the day succeeding that of the regular quartan, so that there is a perfect intermission only on the third day. 6. The *duplicated quartan*, in which two paroxysms occur on the day of attack, with two days of intermission. 7. The *triple quartan*, in which a slight paroxysm occurs on each of the usual days of intermission. These forms of ague, as well as those which have longer intervals (such as five, six, seven, eight, nine, or ten days, a month, or a year), and are called *erratics*, require the same treatment as the three primary types.

A paroxysm of ague consists of three stages, which follow each other with great regularity;—a cold, hot, and sweating stage.

SYMPTOMS.—*Of the Cold Stage.*—Langour and listlessness; sighing, yawning, and stretching; pallor and a sense of oppression at the pit of the stomach; shrinking of the features; and constriction of the skin of the whole body (*goose-skin* or *cutis anserina*); violent shiverings, chattering of the teeth, and trembling of the limbs; pain in the head, back, and loins; blueness of the ears, lips, and nails; the secretions diminished; the urine scanty, pale, and limpid; the pulse small, frequent, and sometimes irregular; and the respiration short and anxious. These symptoms terminate at length in universal and convulsive shaking.

Of the Hot Stage.—The heat of the body gradually returns; at first irregularly, by transient flushes, which are succeeded by a steady, dry, and burning heat, rising much above the natural standard. The skin, before pale and constricted, is now swollen, tense, red, and pungent to the touch, the face flushed, and the eyes injected. The sensibility, which in the cold stage was diminished, now becomes preternaturally acute; the aching of the head is exchanged for acute pain. The pulse becomes quick, full, and hard; there is great thirst; the urine is scanty and high-coloured.

Of the Sweating Stage.—At length a moisture is observed to break out upon the face and neck, which, extending, soon becomes a universal and equable perspiration. The heat now descends to its usual standard; the pulse returns to its wonted frequency, and resumes its usual character, and the respiration becomes free and tranquil; the urine deposits a sediment; all the functions are re-established; and the patient is for a time restored to health.

OCCASIONAL SYMPTOMS.—During the cold stage, coma or apoplexy; during the hot stage, delirium. Convulsions, extreme debility, syncope, rigid spasms, neuralgia, jaundice, dysentery, and petechiæ on the skin, have also been recorded. In ague districts, and in persons who have previously had ague, many diseases assume the intermittent character. Hemicrania, or intermittent face-ache, or brow-ague, is of very common occurrence in persons who have previously suffered from ague.

DURATION OF THE PAROXYSM, &c.—The quotidian is most common in spring, generally occurs in the morning, and its usual duration exceeds twelve hours. The tertian type occurs both in spring and autumn, and commences at noon; the usual duration of the fit is about eight hours. The quartan is more severe, occurs in autumn, and its fit begins in general in the afternoon; duration usually about six hours. The quartan has the longest cold stage, the tertian the longest hot stage. The tertian is the most, and the quartan the least, common.

The type changes after some time, tertians and quartans becoming quotidians, and quotidians becoming remittents, and occasionally ending in continued or typhus fever.

The paroxysms of ague are sometimes *obscure* (*dumb ague*), sometimes *incomplete*, occasionally *inverted*, sometimes irregular or *erratic*, sometimes *partial*, or affecting only a portion of the body.

PERIOD OF INCUBATION.—From a few hours to several days, weeks, or months. Average duration, from ten days to a fortnight.

PATHOLOGY.—During the cold stage, the blood leaves the capillaries of the surface of the body, and accumulates in the deep-seated large vessels; there is congestion in the head, chest, and abdomen; and the vascular spongy organs, especially the spleen, liver, and lungs, if predisposed to disease, are liable to suffer. Accordingly, few persons, in whom the disease has lasted for any length of time, entirely escape those local complications, especially enlargement of the liver and spleen.

TERMINATIONS.—In dropsy, following upon chronic enlargement of the internal viscera; in fatal dysentery; in apoplexy; in fevers of the remittent or continued type.

CAUSES.—1. *Predisposing*. Debility, however induced; exposure to cold and moisture; middle age; the male sex; a previous attack. 2. *Exciting*.—Marsh miasma; the effluvia from vegetable matter in a state of decomposition, in contact with considerable quantities of water. Also the effluvia arising from certain soils, impregnated with moisture, but apparently free from vegetable decomposition. The danger greatly increased by exposure to these effluvia at night.

DIAGNOSIS.—Quotidian ague is distinguished from hectic fever by the coincidence, in hectic, of some disease (as pulmonary consumption), of which it is a symptom; by the absence, in hectic, of a distinct apyrexia; by the occurrence of the paroxysm of hectic in the evening; by the clear complexion of hectic, contrasting with the sallow hue of ague; and by the character of the urinary deposit, which in hectic is pink, in ague, lateritious. Strictures of the urethra, and abscesses in the perineum, and in other parts of the body, often give rise to severe shivering fits, followed by heat flushes, and perspiration, resembling the paroxysms of ague. When a disease supposed to be ague, and treated as such, resists the usual remedies, our inquiries should be directed to the discovery of local disease.

PROGNOSIS.—*Favourable*. The paroxysms of short duration, regular in their recurrence, and the intermissions quite free from fever; the postponement of the paroxysms; the short previous duration of the malady; the quotidian and tertian types.—*Unfavourable*. The disease of long standing; the paroxysms anticipating the usual time of their return; a feverish state during the intermission; the paroxysms being of long continuance, violent, and attended with much anxiety and delirium; complication with other diseases; enlargement of the liver and spleen; the quartan type.

TREATMENT.—*In the Paroxysm.* During the first or *cold* stage. In cold and temperate climates, ague soon yields to treatment; in warm climates it is a much more severe and dangerous malady. The patient should be put into a warm bed, and the warmth of the surface be restored as promptly as possible by a hot brick or bottle to the feet, bags of hot bran or salt to the pit of the stomach, aided by friction of the back and limbs, and the administration of warm diluents, such as tea, gruel, arrow-root, wine and water. The warm, hot-air, or vapour bath may be used, if convenient.

During the *second*, or *hot* stage, the remedies employed in the treatment of the first stage should be laid aside, and cool air, cooling drinks, and sponging with cold or warm water must be substituted.

During the *third*, or *sweating stage*, the patient must be kept quiet, wiped dry after it is over, and his clothes changed. He should then be allowed to sleep. When there is much debility, stimulant drinks, such as warm brandy, or wine and water, may be administered.

Local symptoms present, during any of the three stages of ague, must be treated as the corresponding idiopathic affections.

In the intermission.—The treatment during the intermission consists in the exhibition of one of those remedies which experience has shown to possess the power of preventing the return of intermittent paroxysms; of which remedies quinine and arsenic are the most powerful and efficient.

Cinchona bark, or its active principle, *quinine*, is the staple remedy for the cure of ague, and other intermittent disorders. The sulphate of quinine may be given in the form of pill or mixture, in doses of two grains or more, every two, three, or four hours during the intermission. Single doses of ℈j., ʒss., or even more, have been recommended as of superior efficacy. Repeated small doses, however, are to be preferred.

Arsenic is a remedy of at least equal power with *quinine*. It may be given in doses of 5 drops of Fowler's solution, gradually increased to 12 or more, either alone or in combination with laudanum, every four hours during the period of intermission. Its effects must be carefully watched. If given in the form of draught or mixture, it may be combined with any of the tonic infusions.

℞. Liq. pot. arsenitis, ♏v.
Infus. quassiæ, f℥i.
M. f. Haustus. To be taken three
or four times a-day.

This is the form of medicine which I employ in ague as it occurs in London; it never fails, and it never disagrees. (G.)

Previous, to the administration of the specific remedy, the bowels should be freely opened by a brisk aperient, such as 5 grains of calomel, and 5 grains of colocynth, followed by a black draught.

REMEDIES.—*In the paroxysm, or before it.*—*Bleeding*, during the cold stage, as recommended by Dr. Mackintosh. This remedy is not necessary in the majority of cases of ague in temperate latitudes, except in very plethoric subjects, or where there are signs of congestion of any of the viscera. *Emetics*, given just before the fit, to prevent its occurrence, or during the cold stage, to hasten the approach of the hot fit. *Laudanum*, either alone or combined with ether, in the dose of one drachm of each, may be given with the greatest advantage, either before the cold fit, or, with more effect during the hot stage. This remedy is strongly recommended by Drs. Trotter and Lind. A combination of ammonia (ammon. sesq., gr. v), camphor (gr. v), and aromatic confection (℈i), as given by Mr. G. Dawson at Walcheren.

In the intermission.—Sulphate of zinc; piperin, or the active principle of pepper; salicin, or the active principle of the willow bark; bebeerin; ilicin, or the active principle of the holly; camomile flowers, quassia, and a great variety of remedies belonging to the class of bitters and tonics have been used, and with success, as substitutes for quinine and arsenic. Cures have also been effected by the power of the imagination, or by a sudden shock to the mind; and by such remedies as charcoal, the charred wick of a candle, and cobwebs. In obstinate cases change of air is the best remedy.

PROPHYLAXIS.—Avoidance of the air of early morning and evening, and of sleeping-places near the ground. The choice of a habitation on hilly ground, or sheltered from the source of the malaria by trees. Warm and nourishing food before labour in malarious districts. A moderate allowance of spirituous liquors and tobacco. (?) Small doses of quinine two or three times a-day. The thorough drainage of the soil.

TREATMENT OF THE SEQUELÆ OF AGUE.—Diseases of the spleen and liver are the most common consequences of ague. The treatment required for these affections is change of air, local depletion often repeated, or dry cupping over the part affected, friction with the iodine ointment, or the external application of the tincture of iodine, and counter-irritation by blisters or setons. In disease of the liver, a course of gentle mercurial preparations, or of the nitro-muriatic acid, in doses of from ten to twenty drops in some tonic infusion. Mercurial inunction may also be used with advantage. Much benefit is often derived from a course of Cheltenham or Harrowgate waters. When the enlargement of these organs is accompanied by extreme pallor of countenance, preparations of steel are indicated.

The treatment of hemicrania, or brow-ague, is that of ague itself; as is also the treatment of those intermittent maladies which are known as masked ague, e. g. intermittent vomiting, diarrhœa, &c.

The treatment of the remittent or continued types of fever into which ague sometimes degenerates, is that of those types themselves, with the proviso that the first recurrence of the intermittent type should be met by the use of quinine, or arsenic.

FEBRIS REMITTENS—REMITTENT FEVER.

SYNONYMS.—Gastric fever. Bilious fever. Bilious remittent fever.

DEFINITION.—A fever accompanied by distinct exacerbations of variable duration and severity, but without any complete intermission or apyrexia.

SYMPTOMS.—In the remittent fever of temperate latitudes, those of mild continued fever with periods of comparative freedom. Gastric irritation, with tenderness of the epigastrium, yellowness of the skin, and bilious vomiting, are very generally present in a greater or less degree. Diarrhœa is sometimes superadded; but in many cases aperient medicines are necessary, and in some instances the bowels are obstinately confined. The tongue is either remarkably clean, or covered with a thin fur, or redder than natural at the tip and edges. The pulse ranges from 90 to 120. Head symptoms are rare. When they occur they assume the form of melancholia, rather than of delirium, and in most cases the intellect is unusually clear. In the remittent fever of hot climates, the symptoms of gastric irritation and bilious disorder are more strongly marked; and violent delirium, with intense thirst and great heat of skin, often shows itself at an early period.

DURATION.—From five or six days to four or five weeks. Usual duration about a fortnight.

CAUSES.—*Predisposing*. All causes of debility.—*Exciting*. Marsh miasma, and the exhalations from low damp soils, especially during the summer and autumn months. The disease is most common and most severe in hot climates; but is by no means of rare occurrence in temperate latitudes.

DIAGNOSIS.—From intermittent fever by the incomplete intermission. From continued fever by the recurrence of intervals of comparative freedom from febrile excitement.

PROGNOSIS.—*Favourable*, in proportion to the distinctness of the remissions. *Unfavourable*, when the fever assumes the continued type, and in proportion as the symptoms resemble the unfavourable symptoms of continued fever.

TREATMENT.—That appropriate to continued fever, so long as the intermissions are short and obscurely marked; and that of intermittent fever, as soon as the intermissions become well marked, and of some continuance. Quinine or arsenic may then be given, as in ague, during the remission.

SEQUELÆ.—Diarrhœa and Dysentery.—Enlargement of the liver and spleen, and the peculiar anæmic state known as *leucocythemia.* (See Anæmia.)

The more severe form of remittent fever is described under the next heading of Yellow Fever.

TYPHUS ICTERODES—YELLOW FEVER.

SYNONYMS.—Synochus Icterodes; Bilious Remittent Fever of warm climates; Bulam Fever; Mal de Siam; Vomito Negro; Vomito-Prieto; Coup de Barre; &c.

DEFINITION.—A remittent fever accompanied by yellowness of the skin, partial or general, and by vomiting of a black or dark-brown fluid. The disease assumes, in different epidemics, and often in the same epidemic, the several types of continued, remittent, and intermittent fever, and appears in every degree of severity, from simple ephemeral fever up to the worst form of typhus. Yellowness of skin and black vomit are to be regarded as characteristic of the fever in its most marked form.

SYMPTOMS.—The disease commonly sets in with lassitude, listlessness, faintness, and giddiness, with frequent chills, acute pains in the back and limbs, pains in the head and eyeballs, a flushed face, an anxious expression of countenance, an injected, brilliant, and watery eye, and a hot dry and harsh skin. The mouth is clammy; the tongue generally white and moist, or watery, furred at the centre, and red at the tip and edges. The pulse is frequent, full, and hard; the respiration hurried, and interrupted by frequent sighs; there is great tenderness of the epigastrium, with extreme irritability of the stomach, and vomiting of the ingesta mixed with a glairy fluid. The patient is very thirsty. The bowels are confined, and the evacuations often clay-coloured. The urine is occasionally tinged with bile.

After these symptoms have continued, with increasing severity, from a few hours to three days or more, a marked remission takes place, and the symptoms, as well as the sensations of the patient, continue for several hours so much improved as to excite sanguine hopes of recovery. Sometimes the recovery of the patient dates from this remission, but more frequently the improvement is delusive. The febrile symptoms return, accompanied by increased debility; a small and frequent pulse; a cold and clammy skin; a shrinking of the features; a dry tongue, covered with a brown or black fur; increased tenderness of the epigastrium, with an acrid burning sensation extending to the gullet, with extreme irritability of the stomach, and vomiting of all ingesta.

After a further interval of twenty-four or forty-eight hours, and sometimes earlier, the more characteristic symptoms make their appearance. Yellowness of the skin, beginning in the trunk, and extending rapidly to the whole body; yellowness of the conjunctiva; a feeble, irregular, and intermittent pulse; the tongue and teeth incrusted with black sordes; hæmorrhage from the mouth, ears, nostrils, or bowels, with petechiæ; incessant hiccup; black vomit; and dark and gelatinous stools. In fatal cases, death sometimes happens as early as the third or fourth day, more commonly from the ninth to the eleventh day, and when it goes on into typhus, at a still later period.

Such is the usual course of this disease. But the symptoms are subject to so much variation in different countries, in different epidemics, and even in the same epidemic, that no general description can comprise all the particulars. The following are some of the varieties:—

a. Sudden coma and death in convulsions. *b.* Sudden seizure with black vomit, and death in a few hours. *c.* Intense pain and extreme tenderness in the epigastrium, incessant vomiting, and death from exhaustion. *d.* Great anxiety and restlessness, but with a clean tongue and nearly natural pulse, followed after a time by black vomit and death from exhaustion. Death is sometimes sudden, sometimes the sequel of a quiet sleep, sometimes preceded by acute pain and strong convulsions.

SEQUELÆ.—Organic diseases of the lungs, liver, spleen, or other internal viscera. Obstinate dysentery. Slow and tedious convalescence.

CAUSES.—*Predisposing.* Continued hot weather in warm climates. A temperature of not less than from 75° to 80° Fahr. The latter end of summer and beginning of autumn. The climate of the West Indies, of the south of Spain, of the sea-ports of intertropical America, of Mexico, and of parts of Africa. It occurs more or less frequently, and with greater or less severity, in the West India Islands, at the Havana, at Vera Cruz, at New Orleans, Mobile, Charleston, Baltimore, Philadelphia, and New York, at Gibraltar, and Barcelona. Male sex; intemperance; depressing passions of the mind; all the predisposing causes of common continued fever; especially imprudent exposure to night air. Recent arrival at the place where the disease exists. Want of protection by a previous attack.

Exciting.—Marsh miasma? The disease is of most common occurrence in swamps at the mouths of rivers, and in the low-lying parts of crowded cities. The type of the disease is sometimes that of a remittent, tending to become continued in the worst cases, and distinctly intermittent in more favourable ones. Contagion?

PERIOD OF INCUBATION.—Less than 10 days.

MORBID APPEARANCES.—General yellowness of the skin, sometimes interspersed with blue or livid spots; the brain and its membranes generally natural in appearance, and rarely presenting any unusual effusion of serum or blood; red, livid, or dark black spots and patches on the mucous membrane of the stomach, and its cavity filled with an inky black fluid (black vomit). The intestinal mucous membrane is often of a brown or blackish colour in certain parts, but not ulcerated as in typhus fever; and the intestinal canal contains portions of the same black fluid: the gullet is sometimes found inflamed and abraded; the liver is either greatly congested, or small and anæmic; the bladder is contracted and sometimes inflamed. In some epidemics there has been effusion of blood into the structure of the muscles.

DIAGNOSIS.—In mild cases not always distinguishable from ephemeral or mild continued fever. In severe cases, and in the more advanced stages, it is readily identified by the yellowness of the skin and eye, and the black vomit. The pasty covering, with red tip and border of the tongue, have been mentioned as characteristic of the disease.

PROGNOSIS.—*Favourable.* A regular and steady pulse, a soft and warm skin, a natural expression of countenance, a moist tongue, a free discharge of urine, a distinct remission, natural sleep of some hours' duration, undisturbed by vomiting, a miliary eruption on the skin.—*Unfavourable.* A robust and plethoric temperament. Previous intemperance. Recent arrival on the spot where the disease is rife. The early occurrence of any of the characteristic symptoms of the disease, as of yellowness of the skin, especially if it occur in patches, or of the black vomit. The existence, in an extreme degree of severity, of any of the leading symptoms, as the aching of the eyeballs; the pain in the back; the tenderness in the epigastrium; the acrid burning sensation in the stomach and œsophagus; the incessant vomiting; deep sighing; singultus; collapse; extreme coldness of the surface, with a sensation of internal heat; an irregular or intermittent pulse; and all the symptoms which are regarded as unfavourable in typhus fever. Instances of recovery are recorded, after the appearance of the most unfavourable symptoms; and, on the other hand, "it is known that in persons sitting up in bed amusing themselves, and apparently in a favourable state, the black vomit has suddenly appeared, quickly followed by death, to the utter astonishment of the medical attendants."—*(Gillkrest.)*

MORTALITY.—Very different in different epidemics. The deaths, in various instances, have amounted to 130 or 131 in 134; 19 in 20; 34 in 35; and 1,265 in 1,739; but they have been as few as 6,684 in 16,517; and even as 1 in 8. The mortality is generally greatest when the epidemic is recent, and diminishes considerably in the course of time.

TREATMENT.—*Indications.* I. To unload the stomach and insure the free action of the bowels. II. To induce as speedily as possible mercurial salivation. III. To relieve existing symptoms.

I. The stomach should be unloaded at the very commencement of the attack by an emetic of sulphate of zinc, in the dose of ℈i or ʒss, or of ipecacuanha in the dose of ℈i. The free exhibition of purgatives in this fever is indispensably necessary. They ought to be repeated, and, if necessary, assisted with clysters, until they have produced at least five or six copious evacuations. The thorough evacuation of the whole of the intestinal canal during the first two hours of the fever cannot be too much insisted on.

The best aperient is croton oil, in the dose of one, two, or three drops, repeated if necessary, and administered at intervals, throughout the disease, unless contraindicated by extreme collapse. It may be placed on the tongue, or given suspended in a table-spoonful of mucilage.

A mercurial purgative, consisting of from ten grains to a scruple of calomel, followed in two hours by any saline aperient, or by an ounce of castor oil, may be substituted for the croton oil.

II. The balance of authority is in favour of the use of mercurial preparations so as to affect the gums. This plan of treatment should be adopted without delay. Five grains, ten grains, or a scruple of calomel, should be given every two hours, until the gums are affected; or, after the first aperient dose, the smaller quantity of two grains every hour. Mercurial inunction may also be used in severe cases. The calomel should be administered in a small quantity of gruel or arrowroot; but if diarrhœa be present, it should be given in combination with a quarter of a grain of opium in the form of pill or powder.

III. When the *skin* is universally hot and dry, cold affusion, or cold sponging may be used with the very greatest advantage, the cold affusion being preferred at the outset, and in robust persons, sponging with cold water, in the more advanced stage of the malady, and in the debilitated. The application of cold to be repeated as often as the heat of the surface returns. In applying the cold affusion, the patient is to be seated naked over a proper receptacle, and to have water freely poured over him till he feels chilly, when he is to be wiped dry and placed in bed. When, on the contrary, there is great coldness of surface, the warm bath, at a temperature of 100, or more, and warm frictions, should be employed. *Local determination of blood* may be met by cautious local depletion or by counter-irritation. Bleeding from the arm may be resorted to at the outset of the disease in plethoric subjects, or where comatose symptoms are present. The *sickness* may be met by the constant administration of small quantities of arrowroot, or other demulcent fluids, by effervescing draughts, or by ice or iced-water. The *pain in the eyeballs and forehead* may be relieved by local application of cold to the head, the hair having been previously thinned, or the head shaved. *Hæmorrhages* require the use of the mineral acids with bitter infusions; or the acetate of lead, in doses of two grains, with an excess of acetic acid, and from a quarter to half a grain of opium, every two or three hours. *Collapse* must be treated by diffusible stimulants, and by the other remedies applicable to the treatment of the typhoid stage of fever. Extreme *restlessness* in the advanced stages of the disease, and when great debility is present, requires the use of opium in doses of one or two grains, in combination with from five to ten grains of carbonate of ammonia, and from half an ounce to an ounce of camphor mixture: the dose to be repeated every two or three hours, if the patient has improved under the first dose; or the opium may be given with 20 or 30 drops of oil of turpentine, suspended in gruel or barley-water.

When the patient is convalescent, tonic infusions, especially the infusion of cusparia or serpentaria, with the dilute sulphuric acid, or the sulphuric or nitric or chloric ether, or draughts in which quinine forms the chief constituent, should be given three or four times a-day.

℞. Infus. cuspariæ, f ℥viiss.
Spirit. æther. chlorici. Or,
Spirit. ammoniæ aromat. f ℥ss. M. f. Mistura.
Two table-spoonfuls to be taken three times a-day.

Or,

℞. Quinæ disulphat. ℈i.
Acidi sulph. dil. f ʒi.
Infus. serpentariæ, f ℥vii.
Tinct. upuli, f ℥i. M. f. Mistura.

Remedies.—Much difference of opinion has prevailed, and continues to exist, as to the real nature of this disease, and the treatment which ought to be adopted. *Mercurial preparations.*—The greatest weight of authority is in favour of the administration of large doses of calomel; for instance, from five to ten grains every two hours, accompanied with mercurial inunction, with a view not merely of unloading the bowels, but of affecting the system. Most authors who have tried this plan agree in stating that, when salivation takes place, the patient is safe. *Emetics* have also been strongly recommended at the outset of the disease. *Saline medicines.*—Dr. Stevens asserts, that saline medicines are the only valuable remedy in this fever. He states that the mortality was immense at Trinidad before his arrival, but never so since. Mr. Hacket, on the other side, denies the efficacy of saline medicines, and insists strongly on the superiority of croton oil, which, in spite of the extreme irritability of the stomach, seems to be easily retained, and to act most beneficially. The *médecine expectante* has also its advocates in this as in other diseases.

An emetic at the onset of the fever, followed by croton oil as a purgative, and that by calomel in large and repeated doses, with cold affusion in cases of strong vascular excitement, seem to constitute the most important items of the treatment; to be followed as soon as the disease assumes the typhoid type by the treatment appropriate to that state. But much must depend upon the severity of the epidemic, the character of the patient's constitution, and the symptoms present in the individual case. The practitioner must be prepared to encounter fevers of every type and every degree of severity in the same epidemic.

PROPHYLAXIS.—Temperance, a diet containing an excess of vegetable food, cleanliness, regular exercise, the avoidance of exposure to the heat of the sun, or to the night air, cold spongings or the shower-bath in the morning, and a residence, if possible, on a hill or rising-ground, are to be strongly recommended to the European resident in hot climates, especially where yellow fever prevails. Persons of robust and plethoric habit, newly arrived at a place where yellow-fever prevails, ought to be especially careful to observe all the rules of health; and they may with advantage keep the bowels open by the regular use of gentle aperient medicines. The sick should be separated from the healthy; and hospitals for the sick should be spacious, cleanly, and well ventilated.

CHAPTER IV.

EXANTHEMATA—ERUPTIVE FEVERS.

DEFINITION.

CONTAGIOUS diseases, attacking a person, for the most part, only once, beginning with fever, and followed, after a short and nearly definite interval, by cutaneous eruptions.

GENERA.

VARIOLA	Small-pox.
VACCINA	Cow-pox.
VARICELLA	Chicken-pox.
RUBEOLA	Measles.
SCARLATINA	Scarlet Fever.
PESTIS	Plague.

VARIOLA—SMALL-POX.

DEFINITION.—A contagious disease, setting in with severe febrile symptoms, followed by an eruption which passes through the successive forms of papulæ, vesicle, and pustule in about the space of eight days.

SPECIES.—1. Variola discreta, distinct small-pox; 2. Variola confluens, confluent small-pox; 3. Varioloid, modified small-pox.

1. VARIOLA DISCRETA—DISTINCT SMALL-POX.

SYMPTOMS.—The eruption of distinct small-pox is ushered in by rigors, lassitude, headache, severe pains and extreme weakness in the back and loins, nausea, vomiting, pain in the epigastrium upon pressure, disposition to drowsiness, occasionally coma; and, in infants, by convulsions or epileptic fits. These symptoms are followed by fever of the inflammatory type, with frequent pulse, hot and dry skin, restlessness, and diminished secretions, continuing up to the period of the eruption, and generally undergoing considerable abatement at that time.

At the end of *forty-eight hours* from the first occurrence of rigors, the eruption makes its appearance on the face and forehead, in the form of minute papulæ, sensibly elevated above the surface of the skin.

During the *third* day, or the *third* and *fourth* days, it extends itself successively to the sides of the nose, chin, and upper lip, to the neck and wrists, and at length to the trunk, thighs, and the whole body.

About the *fifth* day, a minute vesicle, appearing depressed in the middle, containing a colourless fluid, and surrounded by an inflamed areola or margin, perfectly circular, may be observed on the top of each little point or pimple. The eruptive fever now undergoes a still further abatement, or entirely disappears.

About the *sixth* day, the saliva becomes increased in quantity and viscid; at the same time that there is a degree of swelling of the throat, difficulty of deglutition, and hoarseness. This arises from the extension of the eruption to the mucous membrane of the mouth and fauces, where it can be seen in the form of small round white spots. The mucous membranes of the eyelids, prepuce, and labia of the female are similarly affected.

On the *eighth* day, the pustules are completely formed and spherical, or prominent, and appearing almost to terminate in a point; the inflammatory areola attains its full size, and the contained matter has assumed the appearance of pus. The face swells; and the swelling extending to the eyelids, these often become so much enlarged as to close the eyes. The mouth, nose, and fauces are also covered with pustules.

About the *tenth* or *eleventh* day (the eighth or ninth from the appearance of the eruption), the inflammatory areola subsides, the contents of the vesicle have changed from a white to an opaque yellow, and a dark spot appears on the centre of each pustule. At this time, the tumefaction of the face subsides, and the hands and feet begin to swell.

After the *eleventh* day, the pustules from being smooth, become rough, break, and discharge their contents; and these drying on the surface, form a small crust. These crusts, in a short time, fall off, and leave the part they covered of a dark-brown colour, which colour often remains for many days; and in cases where the pustules have been large, or late in becoming dry, there are permanent deep indentations of the skin. The swelling of the hands and feet gradually subsides, and about the seventeenth day the secondary fever disappears.

The period occupied by the change from papulæ to pustules is called the period of *maturation*. At different stages of this process, according to the amount of eruption, but generally towards the end of the period, *secondary fever* sets in, characterised by extreme restlessness, sleepless nights, a frequent and quick pulse, scanty and high-coloured urine, and frequently by delirium, especially at night.

2. VARIOLA CONFLUENS—CONFLUENT SMALL-POX.

SYMPTOMS.—Both in its symptoms and progress, the confluent kind differs materially from the distinct or benign. The eruptive fever is more intense, and increases from the first appearance of the eruption to the period of pustulation. The *secondary fever*, which accompanies the decline of the disorder, is also more intense, and often assumes the typhoid character. Coma and delirium are more frequent concomitants; severe diarrhœa is sometimes present, and profuse salivation is apt to occur.

The eruption is also irregular in its appearance, and in the succession of its stages. It is usually preceded by a red efflorescence upon the face, from which the pustules emerge on the second day in the form of small red points; many of which soon coalesce and form clusters greatly resembling those of the measles. Maturation takes place earlier; but the pustules, instead of being circular, are of an irregular shape, are flattened, and sometimes contain, instead of true pus, a brownish ichor; and, instead of being surrounded by an inflamed margin, the spaces between the clusters appear pale and flaccid. The inflammation extends to the subjacent cellular membrane, and ends in severe cases in extensive sloughing. The swelling of the face and salivation commence earlier, and rise to a much greater height than in the distinct form of the disease. The fever, though it generally undergoes a slight remission, does not cease upon the appearance of the eruption; and about the ninth day it suffers a remarkable exacerbation, and in some instances all the worst symptoms of typhoid fever supervene; the eruption assumes a dark livid or black hue; petechiæ, and passive hæmorrhages, bloody urine or dysentery, make their appearance; there are coma, convulsions, and sordes on the lips and teeth, and the patient is often carried off on the night of the eleventh day from the commencement of the disease. Should recovery happen, the pits or scars will be much deeper than in the milder form.

3. VARIOLOID—MODIFIED SMALL-POX.

SYMPTOMS.—Small-pox modified by a previous attack of the disease, or by vaccination, differs in several respects from the disease as it occurs in unprotected persons. The principal points of distinction are the following:—The eruptive fever, though often extremely intense, generally continues during only one day. The patient often complains of some indisposition in the afternoon, passes an extremely restless night, and finds the eruption out in the morning. The first places in which it makes its appearance are generally the wrist and alæ of the nose. A pimple appearing in the latter situation, will often give the first clue to the nature of the disease. The eruption itself runs a shorter course, is rarely confluent, and presents none of the uniformity of the regular disease. A few of the pustules are regularly formed, and present the central depression, but they are commonly smaller than in the unmodified form. Several of the papulæ do not pass to the form of vesicle, and the vesicles die away without suppurating. All the stages of the eruption may be seen on the body at the same time, and all of them imperfect. As soon as the eruption appears, the patient is well, unless it happen to be sufficiently extensive to give rise to irritative fever.

CAUSE.—A specific contagion, emanating from persons labouring under the disease, or from clothes or other articles worn or used by them; or by the introduction of a small quantity of the variolous matter into the system by inoculation.

PROGNOSIS.—*Favourable.* The pustules distinct; the march of the disease regular; the subject healthy. The period of youth. The modified form of the disease.

Unfavourable. The confluent form of the disease; the fever assuming the form of typhus, and the pustules becoming flattened, livid, or interspersed with petechiæ. The sudden disappearance of the eruption, with subsidence of the swelling of the face or extremities, and depression of the pustules, followed by great prostration of strength, universal pallor of the skin, great anxiety, oppression at the chest, syncope, convulsions, coma, or delirium. Complications with visceral disease, such as inflammatory affections of the brain, of the throat, larynx, or lungs, or of the alimentary canal, and suppurations in these viscera, or in the joints. Infancy, and advanced age.

In general, the fate of the patient is determined in the interval between the eleventh and seventeenth day. The crisis of the secondary fever is usually accompanied with a diarrhœa, or sediment in the urine.

SEQUELÆ.—Inflamed pustules, abscesses, superficial ulcers, boils, sloughing of the skin, erysipelas, suppuration of the joints; ophthalmia, followed by blindness from opacity of the cornea; inflammation of the serous membranes of the chest and abdomen; development of tubercles in the lungs, laying the foundation of phthisis; mesenteric disease; scrofula. During the period of convalescence, patients are often attacked with other prevalent diseases, such as typhus fever, erysipelas, and hospital gangrene.

POST-MORTEM APPEARANCES.—On the skin, the eruptions already described. On the conjunctiva, and on the lining membrane of the air-passages, and upper part of the alimentary canal, on the prepuce, and on the labia of the female, small patches of false membrane, or of detached epithelium, or denuded spots of mucous membrane, or actual pustules. In rare cases these appearances extend into the bronchial tubes and intestines. There are traces of local inflammation in various internal organs; the entire body runs rapidly into putrefaction.

DIAGNOSIS.—Difficult at the commencement of the disease. The suddenness of the attack, the intense pain in the head, back, and loins, the sickness, the absence of the local affections of the other severe exanthemata, the prevalence of the disease at the time, and the exposure to contagion, afford a probability in favour of small-pox. The regular succession of appearances, and of changes in the eruption, afterwards render the distinction easy.

In the early stage of the eruption, the papulæ on the alæ of the nose and upper lip give an appearance to the countenance which is highly characteristic. It is sometimes difficult to distinguish the papular stage of the eruption of small-pox from an acute attack of syphilitic lichen; and it may be necessary to speak with caution till the disease is farther advanced.

The distinct may be often distinguished from the confluent, before the eruption appears, by the mildness of its attack, and by the favourable type of the fever.

The modified form is characterised by the short duration of the eruptive fever, by the absence (except in extreme cases) of the secondary fever, and the rapid progress and irregular character of the eruption.

MORTALITY.—In those unprotected by vaccination or by previous attack, about 1 in 4. Average of twenty-five years at the Small-pox Hospital prior to the introduction of vaccination, 32 per cent., or about one-third; extremes in different epidemics 15 per cent. and 42 per cent. *Proportion to total deaths from all causes* prior to 1800, 16 per cent. *Comparative mortality of the unprotected and of those protected by vaccination.*—Period, the epidemic of 1838. Unprotected (all forms of the disease), 157 in 396, or 1 in 2·52; protected, 31 in 298, or 1 in 9·61. The natural small-pox, therefore, is nearly four times as fatal as the modified.—(Dr. Gregory.) *Mortality in the several forms of natural small-pox.*—Confluent 1 in 2; semi-confluent, 1 in 10; distinct, 0 in 19. *Influence of age on the mortality from small-pox.*—From 0—5 years, 42 per cent.; 5—10, 24 per cent.; 10—15, 19 per cent.; 15—20, 24 per cent.; 20—30, 34 per cent.; 30—40, 46½ per cent.; 40—50, 58 per cent.; 50 and upwards, 79 per cent. (Mr. Farr, in Medical Annual. Period, 1780—99, and 1826—35)

LAWS OF CONTAGION.—Communicated by contact or through the air, by the living and dead body; by the pustules; by the dried scabs; or by substances imbued with the variolous matter. The period at which a patient begins to be able to communicate the affection, and at which he ceases to be dangerous to others, has not been ascertained. Rarely occurs twice in the same person. Epidemic at certain seasons, as in 1781, 1796, 1825, 1838, and 1845.

PERIOD OF INCUBATION.—Usual duration, twelve days; limits, ten to sixteen days.—(Dr. Gregory.)

TREATMENT.—*Before the appearance of the eruptive fever*, the treatment will be the same whatever may be the nature of the impending disease. An emetic (Pulv. ipecac. ℈i.; Antim. pot. tart. gr. i.), followed by a brisk saline aperient (Magnes. sulph. ℥ss.; Infus. sennæ c. f ℥iss.; Tinct. sennæ f ℥ss.), to remove any offending matter from the primæ viæ; bleeding in the plethoric; the antiphlogistic regimen, if inflammatory symptoms run high; stimulants in extreme nervous depression; opium in great nervous irritability; bleeding and stimulants in congestion, in order to restore reaction, and to relieve the circulation.

2. *During the eruptive fever*, when this is of the inflammatory kind, the febrile symptoms, if considerable, are to be moderated by exposing the body of the patient to a cool atmosphere, by frequently administering cold diluent fluids, as lemonade, imperial, saline draughts, &c.; at the same time administering saline aperients, so as to keep the bowels loose. Cold affusion may also be employed with advantage when there is much heat of skin; but cold or tepid sponging, limited to the hands and arms, is to be preferred.

3. *After the appearance of the eruption*, the indications are:

I. To moderate the fever when violent.

II. To support the strength when deficient.

III. To subdue local inflammation and relieve occasional symptoms.

I. In full and plethoric habits, and in cases of violent action, bleeding has been recommended, but it should be avoided if possible; for the subsequent debility generally overbalances the temporary advantage that may be gained by this remedy. In place of bleeding, mercurial and saline aperients, tartar emetic in doses proportioned to the amount of fever present, the antiphlogistic regimen, and free ventilation of the patient's apartment, should be prescribed.

II. When the patient's strength fails, he must be supported by tonics or stimulants, according to the degree of the existing debility. Quinine, or the tonic infusions, may be prescribed in the lesser degrees of weakness, wine and ammonia when the debility is more considerable. If with the debility there is great irritability and restlessness, opium in small quantities, cautiously increased, or laudanum may be combined with the tonic or stimulant.

III. When the eyelids swell much, and are inflamed, a blister may be applied behind the ears, or leeches to the temples. In such cases, and when the face is swollen, olive oil or cream is often applied to the surface with advantage.

If the throat be much affected, and there is difficulty in swallowing, a blister is to be applied to the neck, and gargles of infusion of roses directed.

Determination to the head or chest, or other viscera, requires blisters, the pediluvium, sinapisms to the feet, and the ordinary remedies applicable to idiopathic inflammation of the same parts.

Obstinate vomiting, which in this disease often proves both a troublesome and dangerous symptom, is most effectually allayed by saline remedies, in the act of effervescence, with laudanum. If there is tenderness at the epigastrium, a warm bread-and-water poultice may be applied, preceded, in severe cases, by a few leeches.

If the febrile symptoms indicate a tendency to typhus, the mode of treatment recommended for the milder form of typhus fever should be resorted to.

If after the eruptive fever has passed away, the patient suffers from profuse sweats, a cool regimen, and the dilute mineral acids in combination with tonics (Acid. sulph. dil. ♏xx; Infus. quassiæ, f℥i; Tinct. lupuli, f ʒss.) should be given three or four times in the day.

Diarrhœa, when excessive, is to be checked by small doses of laudanum (three, four, or five drops), with chalk mixture, or by the Pulvis cretæ c. Opio, in doses of ten grains, or a scruple, three times a-day.

When the eruption suddenly recedes, or the pocks sink and become very much dimpled, and any alarming symptoms supervene,—as rigors, convulsions, or delirium,—recourse must be had to depletion and counter-irritants; leeches to the temples, blisters to the nape of the neck, and sinapisms to the feet and legs. The cold dash applied to the head whilst the body is in a warm or vapour bath, may be used with great benefit.

The secondary fever requires the treatment of continued fever of the same type and degree of severity.

In favourable cases of modified small-pox, but little treatment is required beyond the administration of an occasional saline aperient, and the avoidance of excess in diet.

In all cases of small-pox the warm bath should be used repeatedly during the stage of convalescence.

Prevention of pitting.—Several plans have been recommended for preventing the pitting of small-pox. All of them consist either (1) in protecting the parts from the air; or (2) in letting out the contents of the vesicles before they have changed from lymph to pus; or (3) in exciting common, in lieu of specific, inflammation.

1. Mercurial plasters—an ointment consisting of equal parts of mercurial ointment and powdered starch, and the common sulphur ointment—have been applied with advantage in the early stage of the eruption. They should be applied to, or smeared over, the face in males, and the face, neck, and arms in females. Collodion has been advantageously substituted for these applications.

2. Puncturing the vesicles as soon as they are fully developed, with a fine needle, and absorbing their contents with soft cotton, is a very effectual method; but it is very tedious.

3. Nitrate of silver in substance, or in strong solution, applied to the pustules is also advantageous. Tincture of iodine has been substituted for the solution of lunar-caustic, and with benefit.

VACCINA—COW-POX.

Synonyms.—Vacciola, vaccinia, kine-pox, vaccine disease.

The benefits conferred on mankind by the discovery of vaccination, as a preventive of small-pox, are now universally admitted. If the virus be genuine and properly inserted by inoculation, the human body is, to a certain extent, protected from the attacks of small-pox, and the disease, if it occur, is in most cases greatly mitigated. The protection seems, however, to be less effectual during severe epidemics, when the power of the contagion is at its height; and the mortality of the protected seems to be increased when they are treated in hospitals for the cure of small-pox.

MODE OF PERFORMING THE OPERATION.

In performing this operation three or four punctures should be made near each other, in one arm, or in both arms, about the insertion of the deltoid muscle. The skin being made tense, a sharp lancet should be inserted obliquely downwards under the skin, so as to draw a single drop of blood. If the matter is taken from the arm of another child, the lancet should be dipped in the lymph of the vesicle, and then inserted in the punctures. If the matter is on slips of glass, it must be first moistened by the breath. If points are used, the same precaution must be observed before they are inserted into the punctures.

DESCRIPTION OF THE AREOLA.

If the operation has been properly performed, the course of the eruption is somewhat as follows:—

Second day.—Small red spots appear which feel hard, but, when viewed under the microscope, are seen to be vesicular.

Third or fourth day.—The spots are larger and more perceptible.

Fifth day.—Small pearly circular or oval vesicles appear corresponding to the punctures, and containing a minute quantity of transparent fluid.

Eighth day.—The vesicle has attained its perfect form and full size, with depressed surface and raised margin. On the evening of this day, the vesicle begins to be surrounded by a circular rosy areola, and the skin for some distance around it is tense and painful. There is also slight febrile disturbance.

Ninth and tenth days.—The areola increases, and is often accompanied by extensive erythema of the arm, and sometimes by a lichenous eruption over the whole body.

Eleventh day.—By this time the vesicle, if it have not been opened, has burst, the areola has begun to fade, the centre of the vesicle is covered with a brown scab, which first hardens and blackens, and about the *twentieth* day falls off, leaving a deep mark, or indentation on the skin, of a circular form, with as many pits as there were cells in the vesicle, and proportioned in size to the previous inflammation. Unless all these appearances are observed, a spurious cow-pox has been communicated, and re-vaccination is absolutely necessary.

The best time for taking the matter is from the fifth to the eighth day, and from that to the twelfth, but after this time it cannot be depended on; or if any cause, such as friction or injury, has disturbed the progress of the vesicle. The disease will not be properly communicated should there be a chronic eruption on the arms; if scarlatina, measles, or other cutaneous diseases supervene; or if dentition, disordered bowels, or any other malady be present. Sometimes boils, pustules, and leprous and impetiginous eruptions, succeed the vaccine disease; but this seldom happens when the child's health is good at the time of vaccination. Such eruptions are readily cured by mercurial alteratives and gentle aperients.

Infants may be vaccinated at any time after the sixth week. The age of three months is to be preferred, if the child be healthy.

Some have recommended the repetition of vaccination at intervals of a few years. This is a wise precaution, justified by experience, and if adopted, should be performed a second time at about ten years of age, or from this to the age of puberty. As it may be practised without inconvenience, it may be well to resort to it in epidemic years, whenever we are unusually anxious to insure protection against small-pox, or to allay the fears of timid persons.

The best argument for re-vaccination is founded on the result of that operation in the Prussian army. In the year 1841 nearly 45,000 soldiers were re-vaccinated, and though before that time varioloid disease was very prevalent in the barracks, only eight cases occurred after re-vaccination.

As it is highly important that the amount of protection afforded by vaccination should be understood, the following tables have been constructed :—

EPIDEMIC IN SCOTLAND, 1818–1819. DR. JOHN THOMPSON.

	Unprotected.	Small-pox second time.	Small-pox after Vaccination.
Cases	205	71	310
Deaths	50	3	1
Proportion	1 in 4.	1 in 23	1 in 310

The following table, reduced to a uniform scale of 15,000, is founded on the facts recorded by M. Favart during an epidemic of small-pox which took place at Marseilles in 1828. The estimated population under 30 years of age was 40,000, of whom 30,000 had been vaccinated, 2,000 had had casual small-pox, or small-pox by inoculation, and 8,000 were unprotected. The inference to be drawn from these facts is, that vaccination, though a less complete protection against attacks of small-pox than inoculation or a previous attack of the disease, is the best existing protection against a fatal attack of small-pox.

MARSEILLES.—EPIDEMIC OF 1828.—ESTIMATED POPULATION, 40,000.

	Unprotected.	Previous Small-pox or Inoculated.	Vaccinated.
Estimated number	15,000	15,000	15,000
Attacked	7,500	150	1,000
Died	1,875	30	10
Proportion of attacks to estimated number	1 in 2	1 in 100	1 in 15
Proportion of deaths to attacks	1 in 4	1 in 5	1 in 100

See Watson's Lectures on the Practice of Physic. Dr. Gregory (Lectures, p. 219) states, that "small-pox in the unvaccinated is five times more fatal than it is to those who have previously undergone vaccination." According to the first of these tables, it is nearly eighty times, and according to the second, twenty-five times more fatal.

From a tabular statement appended to a paper, read by Dr. Gregory before the Medico-Chirurgical Society of London, March 9, 1852, it appears that in the Small-pox Hospital, during the 11 years 1841–1851, there were 4,091 admissions with small-pox, distributed as follows:—

		Deaths.	Mortality. per cent.
Persons not alleging any protection	1,722	629	37
,, alleging prior small-pox	36	6	17
,, ,, vaccination, but showing no scars	166	56	34
,, ,, vaccination, and having scars	2,167	147	7

(See Med. Times and Gazette, June 26, 1852.)

Dr. Gregory (Libr. of Med., vol. i. p. 323) expresses an opinion "that all idea of banishing small-pox from the earth is vain and illusory." The facts which he adduces do not seem to bear out this view of the case. But, on the other hand, where vaccination has been extended for a term of years to an entire population, without exception, there is evidence that small-pox has disappeared. (See Sir Gilbert Blane's Essay on Vaccination, and Baron's Life of Jenner.)

VARICELLA—THE CHICKEN-POX.

Definition.—A contagious disease, ushered in with slight febrile symptoms, followed by a vesicular eruption which generally runs its course in five days.

Synonyms.—Swine-pox, Bastard-pox, Gland-pox, Crystalli.

Symptoms.—Within twenty-four hours after slight symptoms of fever, such as lassitude, loss of sleep, wandering pains, and loss of appetite, an eruption appears: first on the back, consisting of small reddish pimples, much resembling the first appearance of the small-pox. On the *second* day, the red pimples have become small vesicles, containing a colourless fluid, and sometimes a yellowish transparent liquor. On the *third*, the vesicles arrive at their full maturity. Soon after, the fluid becomes extravasated by spontaneous or accidental rupture of the tender vesicle, and a thin scab is formed at the top of the pock, without pus ever being formed, as in the true variola. Generally before the *fifth* day the whole eruption disappears, without leaving behind it any cicatrix or mark.

Cause.—*Predisposing.* The period of infancy and childhood.—*Exciting.* A peculiar contagion.

Diagnosis.—*From variola.* By the small degree of fever; by the short interval (24 hours) between the first symptoms and the appearance of the eruption; by the pimples first appearing on the back; by no suppuration taking place; by the absence of indentation; by the pustules falling off, in scales, about the fifth day; at which period the eruption in variola is only just completed. From modified small-pox, by the absence of pits in all the vesicles.

Prognosis.—It is entirely free from danger, unless the eruption be of the confluent kind, when the danger may be judged of from the degree of violence of the concomitant fever.

Treatment.—This complaint is of so trivial a nature as seldom to require the aid of medicine. Gentle saline aperients are all that are in general necessary. Should there be accidentally much fever, the same means may be employed for moderating it that are recommended in small-pox. The treatment may be terminated by a warm bath.

RUBEOLA—THE MEASLES.

Definition.—A contagious disease, commencing with catarrhal symptoms, followed, about the fourth day, by a peculiar eruption on the skin.

Synonym.—Morbilli.

Species.—1. Rubeola vulgaris; 2. Rubeola maligna.

1. RUBEOLA VULGARIS.

Symptoms.—The premonitory symptoms resemble an attack of catarrh. After rigors and flushes, lassitude, heaviness, pain in the head and drowsiness, there are ringing cough; hoarseness; difficulty of breathing; frequent sneezing; itching of the face; smarting of the eyes, swelling of the eyelids, with copious secretion of watery fluids from the eyes and nostrils; nausea or vomiting, thirst, furred tongue, frequent pulse, and the general symptoms of fever.

On the *fourth* day, small red points appear, first on the face, and afterwards on the lower parts of the body. They are generally in crescentic clusters, do not rise into visible pimples, but are found by the touch to project slightly above the surface.

About the *eighth* day, but sometimes as early as the *fifth* or *sixth* day, the colour of the eruption begins to fade: first upon the face, then upon the trunk and limbs; and, in a day or two more, the eruption entirely disappears, with a mealy or furfuraceous desquamation of the cuticle. The fever and catarrhal symptoms subside at the same time, and the expectoration changes from a transparent mucus to an opaque-whitish or yellowish-white sputum.

The catarrhal and febrile symptoms sometimes subside on the appearance of the eruption; but in the majority of cases they increase, and are attended with much anxiety and oppression of the præcordia, and symptoms of pneumonia. The fever, however, generally undergoes considerable abatement when the rash begins to fade away. At the period of desquamation of the papulæ, a diarrhœa frequently comes on, and continues for some time.

The eruption may occur without catarrh (*rubeola sine catarrho*). On the other hand, cases are believed to occur, in which a fever, resembling in character and duration the fever of measles, takes place without the cutaneous eruption.

2. RUBEOLA MALIGNA.

This form of the disease is ushered in by more severe premonitory symptoms, and soon assumes the typhoid character. The eruption appears early, but irregularly; alternately receding and reappearing; it assumes a dark or livid hue (*rubeola nigra*), and is often interspersed with petechiæ. The fauces often assume a dusky-red or livid hue; all the symptoms are aggravated; there is great tenderness in the abdomen, with dark offensive stools; delirium is present, or coma, or convulsions; and the affection of the mucous membrane of the air-passages passes into croup or severe pneumonia. The patient dies exhausted by diarrhœa, or asphyxiated by the congestion of the lungs, or comatose from the severity of the head-affection.

Cause.—*Predisposing.* The period of infancy and childhood; but the disease may occur at any age.—*Exciting.* A specific contagion, of which patients are generally susceptible only once during their lives.

Diagnosis.—The pathognomonic symptoms are the peculiar dry ringing cough and hoarseness; the heaviness of the head and drowsiness; sneezing; coryza; the appearance of the eyes, which are red, swelled, itchy, very sensible to light, and frequently loaded with tears. It is distinguished from *Scarlatina* by its darker hue, by the defined character and crescentic arrangement of the patches, by the marked catarrhal symptoms, and the absence of the severe affection of the throat: from *Roseola*, by the catarrhal symptoms, by the darker hue and more sudden appearance of the eruption, and by the greater severity of the symptoms.

PROGNOSIS.—*Favourable.* The febrile and other symptoms slight; moderate diarrhœa; early and free expectoration; a moisture on the skin at the appearance of the eruption. *Unfavourable.* A high degree of fever; hot and parched skin; hurried and difficult breathing; flushed countenance; unusually hard pulse. The fever increasing after the appearance of the eruption, and assuming the form of typhus; great pain in the head and eyes; shooting pains in the chest; symptoms of pneumonia or cynanche; no expectoration before the fourth day; the pulse rapid and small; delirium or coma; extremely anxious respiration; continued diarrhœa or vomiting. The sudden disappearance of the eruption, succeeded by delirium, great anxiety, laborious respiration, acute pains in the chest, or violent diarrhœa; the eruption becoming of a livid hue.

SEQUELÆ.—Pneumonia, cynanche trachealis, bronchitis, phthisis; diarrhœa, enlargement of the mesenteric glands; ophthalmia, abscesses in the ear, swelling and suppuration of the parotids; aphthæ and gangrene of the mucous membrane of the mouth.

PERIOD OF INCUBATION.—Six to sixteen days.

POST-MORTEM APPEARANCES.—Marks of inflammation in the internal organs, especially of the air-passages and lungs.

TREATMENT.

Of the Rubeola Vulgaris.

Indications.—I. To diminish the inflammatory action. II. To relieve urgent symptoms.

I. The first indication is fulfilled by abstinence from animal food, and strict adherence to the antiphlogistic diet; by placing the patient in a moderately cool atmosphere, the temperature of which should be regulated in a great measure by his own feelings, carefully guarding against any sudden change or exposure to severe cold; by the occasional exhibition of saline aperients, and by the common refrigerants and diaphoretics, of which tartar-emetic is the best.

When the febrile symptoms run high, and more especially when there is a threatening of local inflammation, tartar-emetic must be given in nauseating doses, at short intervals.

II. If the disease be accompanied by inflammation of the lungs or larynx, leeches must be applied to the seat of the inflammation, in number proportioned to the age of the patient, and the severity of the inflammation. The patient should then be placed in a warm bath, and nauseating doses of tartar-emetic should be given every two, three, or four hours. A bread-and-water poultice may also be applied over the sternum, but blisters should be avoided.

Hoarseness, cough, and inflammation of the fauces will be palliated by barley-water, with acacia gum; thin arrowroot; orgeat and water; the compound decoction of barley, or capillaire and water, taken frequently in very small quantities, not cold, but with the chill just removed. The addition of a little nitre, or of a small quantity of lemon-juice, will render these drinks more palatable. Inhaling the steam of warm water is also serviceable.

Mild opiates are occasionally useful after the febrile action is abated; but when given before, they neither procure rest nor an abatement of the cough. An opiate, given at bed-time, should always be combined with a saline diaphoretic. Dover's powder, in a dose proportioned to the age of the patient, is the best form of opiate.

Diarrhœa, if excessive, may be treated by the compound chalk and opium powder three or four times a-day. Should the diarrhœa continue, and threaten great exhaustion, the dose of the powder should be increased, and emollient clysters should be administered from time to time. The more powerful astringent remedies recommended in the treatment of diarrhœa (see *Diarrhœa*) should be reserved till this more simple treatment has failed.

When diarrhœa does not take place spontaneously, the bowels must be relieved by castor oil, or some simple saline aperient.

Of the Rubeola Maligna.

The treatment of malignant measles is similar to that of typhus fever; it requires the exhibition of mineral acids, quinine, wine, ammonia, &c., according to the degree of the existing debility.

When the eruption of measles disappears before the proper period, and convulsions, or great anxiety, or delirium take place, the indication will be to restore the eruption to the skin. To effect this, recourse must immediately be had to the warm bath, blisters or sinapisms to the chest and feet, the administration of warm wine and water, ammonia, camphor, æther, or other appropriate stimulants. The Liquor ammoniæ acetatis, in doses of from ʒi to ℥ss, according to the age, may be administered at short intervals.

During convalescence, the diet should be nutritious, the bowels regulated, and the dress warm. Great care should be taken to avoid exposure to cold.

Prophylaxis.—The same precautions are required to prevent the spread of the contagion, as in other contagious maladies. Inoculation with blood taken from the patches, or with the secretion of the conjunctiva, has been practised with some advantage. The cases of the disease which have followed inoculation have been mild and favourable.

SCARLATINA—SCARLET FEVER.

DEFINITION.—A contagious disease, setting in with fever, followed by a scarlet eruption and inflammation of the throat, on or about the second day, and terminating in desquamation of the cuticle.

SPECIES.—1. Scarlatina simplex; 2. Scarlatina anginosa; 3. Scarlatina maligna; 4. Scarlatina without eruption.

1. SCARLATINA SIMPLEX.

SYMPTOMS.—After the usual premonitory symptoms of fever—viz., cold chills, shivering, nausea, and sometimes vomiting, with pain in the head, back, and limbs—thirst, hot skin, frequent pulse, restlessness, and sleeplessness. On the *second* day, in the greater number of cases, a bright scarlet efflorescence is perceptible on the face, neck, and breast, whence it extends over the entire trunk and limbs. At first it consists of innumerable red points, separated by interstices of the natural colour: these spots soon coalesce, so that in a few hours the redness becomes universal. The skin is rendered pale by pressure, but the colour immediately returns. After the lapse of *one* or *two* days, the efflorescence again becomes partial, is arranged in large irregular patches, and does not disappear on pressure. The skin is perceptibly rough to the touch, and in some instances it is studded with small miliary vesicles. The rash generally begins to decline on the *fifth* day, is very indistinct on the *sixth*, and wholly disappears by the *eighth* day. Desquamation of the cuticle generally begins on the parts first affected about the end of the *fifth* day, and soon extends to the entire body. The cuticle separates in the form of scurf on the trunk and limbs, and in large scales from the hands and feet. This process of desquamation is often accompanied by great itching, irritation, and tenderness of the skin. The mucous membranes are more or less affected at the same time: the eyelids, the lips, the edges of the tongue, the soft palate, the pharynx and nostrils, are of a bright-red colour; the tonsils are slightly enlarged, and there is some difficulty in swallowing. The papillæ of the tongue are elongated, and project as bright-red points through the white mucus which covers its surface; or the whole tongue is of a bright-red colour with prominent papillæ. The appearance of the tongue in the first case bears a close resemblance to that of a white strawberry; in the second to that of the red variety. The febrile symptoms do not suffer any abatement on the appearance of the rash, but they subside with it, leaving, in most cases, great debility behind them. The pulse is generally very frequent, and the skin very hot. 120 or 130 is not an uncommon frequency of pulse; and the temperature has been known to rise to 105°, 106°, and even 112° Fahrenheit. There is generally some increase of fever at night, with slight delirium, even in favourable cases; the bowels are generally confined, and nausea and vomiting are not of very common occurrence. The urine is often scanty and high coloured, and in the decline of the disease, is often found to contain albumen.

Although the eruption in scarlet fever usually occurs on the second day, there are many exceptions to the rule. During the prevalence of scarlet fever, cases are constantly occurring in which there is slight sore throat, and a suspicious appearance of tongue, with little disturbance of health for three, four, or five days, at the end of which time the eruption makes its appearance, and the disease generally runs a mild course. I at first felt some difficulty in my prognosis in these cases, but I soon found that, however slight the other symptoms might be, there was always during this latent period a very frequent, full, and peculiarly compressible pulse. Wherever such a pulse exists, with suspicious symptoms, some febrile disease may be confidently looked for. On the other hand there are cases in which the eruption makes its appearance much earlier, as in a young lad of sixteen, who felt ill for the first time at five o'clock in the evening, and had the eruption full out upon him before twelve o'clock at night. The case was intermediate in severity between scarlatina simplex and scarlatina anginosa. (G.)

2. SCARLATINA ANGINOSA.

SYMPTOMS.—Those of scarlatina simplex, but in an aggravated form, with a more severe affection of the throat, and parts adjacent.

The submaxillary glands are enlarged and painful to the touch; the velum pendulum palati, the uvula, the tonsils, and pharynx, as far as the eye can reach, partake of the general redness. Collections of thick mucus prove very troublesome to the patient, and specks are often observed, much resembling the sloughs in cynanche maligna; yet real ulceration seldom takes place. The mouth is opened with difficulty, there is great pain in swallowing, and liquids often return through the nostrils. The papillæ of the tongue are elongated and elevated, the organ itself is very red, the inflammation may extend along the mucous membrane of the fauces, nostrils, and Eustachian tube, and be followed by purulent discharge from the nostrils and ears. The skin is of a deeper colour, and the eruption spreads more rapidly over the surface.

Not unfrequently after a few days' amendment, an unaccountable langour and debility are felt; the pulse is accelerated; the sleep is disturbed; the appetite altogether fails; the secretion of urine is nearly suppressed; dropsical swellings make their appearance; sometimes anasarca alone; sometimes combined with ascites or hydrothorax.

3. SCARLATINA MALIGNA.

An intense inflammation of the throat at the onset of the disease, followed by extensive sloughing, and accompanied by great enlargement of all the salivary glands, characterise this form of disease. The eruption appears late, in irregular patches of a paler colour, sometimes disappearing suddenly. The other symptoms are those of typhus in its worst form.

4. SCARLET FEVER WITHOUT ERUPTION.

It is not uncommon for those who have had scarlet fever in its usual form, when again exposed to the contagion to have the characteristic sore throat succeeding the usual premonitory symptoms, and even followed by desquamation of the cuticle. There is good reason to believe that such persons are capable of communicating the common type of the disease to others. It may be well to state that it is now usual for medical men, with a view to satisfy the minds of their patients, to designate mild cases as *scarlatina*, and severe cases as *scarlet fever*.

SEQUELÆ OF SCARLET FEVER.—Acute desquamative nephritis, with anasarca, and occasionally with other dropsical affections, such as ascites, hydrothorax, hydrocephalus, and hydropericardium; pain and swelling of the larger joints; scrofulous affections; discharge from the nostrils; discharge from the ears, and permanent deafness; suppuration of the glands of the neck; inflammation of the eyes and eyelids; inflammatory affections of the internal viscera; abscesses of the testis; troublesome diarrhœa. Anasarca, which is the most formidable of the sequelæ of scarlet fever, often follows on the mildest attacks.

POST-MORTEM APPEARANCES.—Traces of inflammation extending from the fauces through the œsophagus, and sometimes through the whole of the alimentary canal. Tenacious mucus extending into the œsophagus. Congestion or inflammation of the kidneys.

CAUSE.—*Predisposing*. The age of infancy and childhood; but no age is exempt, and second attacks are not infrequent.—*Exciting*. A specific contagion.

PERIOD OF INCUBATION.—From two or three days to a fortnight. It is sometimes stated at five days.

DIAGNOSIS.—*From measles*. By the absence of cough, sneezing, and coryza; by the affection of the throat; by the peculiar appearance of the tongue; by the character of the eruption, its greater extent, and less-defined form; by the occurrence of the rash on the second instead of on the fourth day. The great frequency of the pulse and the high temperature of the skin are also highly characteristic of scarlet fever.

PROGNOSIS.—*Favourable*. The concomitant fever purely inflammatory, and slight affection of the throat; remission of the febrile symptoms, and of the affection of the throat, upon the appearance of the eruption; hæmorrhage from the nose of a florid-red colour; diarrhœa, or other critical discharge.

In one case, I have known all the threatening symptoms pass away, after a profuse discharge of mucus from the nostrils. (G.)

Unfavourable. The eruption being preceded by great anxiety, nausea, and vomiting; the fauces of a dark-red or purple colour, without swelling; ash-coloured or brown specks, soon becoming ulcerated, or terminating in gangrene (*cynanche maligna*); great prostration of strength; delirium; coma; the early or very late appearance of the eruption. Its coming out in patches is more unfavourable than an universal efflorescence; the fever continuing after the period of desquamation; glandular swellings; anxious difficulty of breathing, and peculiarly stridulous voice, indicating the extension of the disease to the larynx and trachea; acute pain in the ear, with deafness; the saliva tinged with blood of a dark colour; discharge of acrid matter from the nose; running from the ears; skin continuing obstinately dry; the desquamation followed by a fresh efflorescence and increase of fever; diarrhœa; inflammation and suppuration of the parotid, submaxillary, salivary, and cervical glands; congestion or inflammation of the brain or lungs. The pregnant state.

A favourable convalescence may be expected when the pulse falls much below its natural frequency in health; and a marked improvement is generally indicated by a fall of the pulse at night as compared with its frequency in the morning. A frequent pulse continuing, when the urgent symptoms have subsided, would lead us to anticipate a lingering convalescence or the occurrence of secondary symptoms. (G.)

Treatment of Scarlatina Simplex.

All that will in general be requisite in the treatment of scarlatina simplex, in its mild form, is to keep the patient in a moderate and equable temperature, about 60° Fahr.; to preserve the apartments clean and open; to enforce a light diet without animal food; to direct cooling acidulated liquors for common drink, and to administer gentle aperients, more particularly towards the decline of the eruption. The treatment may be advantageously commenced with an emetic (Ipecacuanha, ℈i; Antim. pot. tart. gr. i. for the adult), followed by a saline aperient, or by a full dose of castor-oil.

Treatment of Scarlatina Anginosa.

Indications.—I. To lower febrile action. II. To reduce the inflammation of the throat without exhausting the strength of the patient.

I. The first indication is best fulfilled by nauseating doses of tartar emetic. When the heat of the body is much, and steadily, above the natural degree, the *cold affusion* may be employed, or (and this is to be preferred) the body may be frequently sponged with cold or with warm water. When this remedy is used with due precaution, it is attended with the best effects, and there is little fear of repressing the eruption.

II. Where severe inflammation of the throat is present, prompt remedies are necessary. General bloodletting should be avoided, unless there is very high febrile action; but local bleeding by leeches may be advantageously resorted to; the leeches being followed by a large warm bread-and-water poultice. Ice swallowed freely, and cold lotions or ice, applied externally to the throat, are the chief remedies. In employing them, we must take care that the heat of the body generally is not too much reduced. Used with this precaution, this local application of cold will not be found to interfere with the progress of the eruption, nor to be attended with any other risk. Where ice cannot be procured, cold liquids must be substituted. Blisters, strong liq. ammoniæ, sinapisms, or hot turpentine, may be applied externally with some advantage. Acidulated gargles may be used to clear the throat of the tenacious mucus which is thrown out; but if ice can be procured, these are unnecessary. A strong solution of lunar caustic applied to the fauces with a camel's-hair brush often gives great relief.

At the decline of the eruption, tonics are required, especially quinine, cinchona, or cascarilla; a nutritious diet also, with wine.

Treatment of Scarlatina Maligna.

Scarlatina, which assumes the typhoid character, at whatever period of its course, is a highly dangerous disease, and requires the employment of cordial tonics, acids, and wine, in large and repeated doses, as recommended for the cure of the typhoid form of continued fever. When the throat is covered with sloughs, stimulating and astringent gargles must be used very often. Of these, the Cayenne-pepper gargle is the most efficacious. Gargles containing chlorine are also to be strongly recommended. Or a strong solution of nitrate of silver (℈i. or more to the ounce) may be applied to the throat with a camel's-hair brush.

Children sometimes are with difficulty prevailed upon to gargle the throat; in this case, the gargle may be injected into the nostrils, or the nitrate of silver solution may be applied with the brush.

Chlorate of potash (a drachm to a pint of water) has been strongly recommended as a drink in cases of severe scarlet fever. A pint to a pint and a half to be taken in the course of the day.

When anasarca, ophthalmia, pneumonia, cerebral affections, or other diseases succeed scarlatina, they are to be treated on ordinary principles, according to the severity of the inflammation and the existing state of the system.

Proper aperients, tonics, nutritious diet, warm clothing, and cautious avoidance of exposure to cold or damp, must be employed and observed after recovery from this disease.

Prophylaxis.—As the disease is highly contagious, the same precautions are required to prevent it from spreading as are recommended under the head of Continued Fever (see p. 262). Free ventilation of the sick chamber, the prompt removal of excreta, the placing of all linen removed from the person in cold water, and strict separation, are the principal means to be adopted during the progress of the disease; the thorough cleansing of the apartment, of the bedding, and of its furniture, after the recovery of the patient. Belladonna has been recommended as a prophylactic on the strength of the property, imagined to belong to it, of producing symptoms analogous to those of scarlet fever. Three drops of a solution of three grains of the extract of belladonna in an ounce of water is given twice a-day for a child of one year old, and an additional drop for every additional year of life. Very small doses of calomel and of the sulphuret of antimony in combination have also been recommended.

For an account of the dropsy, which is the most common sequela of scarlet fever, see Anasarca and Nephritis.

PESTIS—PLAGUE.

DEFINITION.—"An exanthematous disease, the eruption consisting of buboes, carbuncles, and pustules, white, livid, or black, and generally attended with malignant and very fatal fever."

SYMPTOMS.—The patient is attacked suddenly,—or after slight premonitory symptoms, consisting of rigors, lassitude, depression of spirits, pain and weight of head, and giddiness,—with an indescribable feeling of anxiety about the præcordia, and extreme restlessness and severe pain referred to the region of the heart. The countenance is expressive of exhaustion and anxiety, the eye is dull and sleepy, the eyelids closed, the mouth half open. The gait is staggering and uncertain, like that of a drunken man; the debility extreme; the head falls upon the breast; the eyes are dull and sunken, the complexion dingy; there is bilious vomiting; the tongue is swollen, furred, and glistening, but moist and clean towards the tip and edges; pulse from 115 to 130, and very feeble; respiration hurried; speech indistinct and faltering. Darting pains in the axillæ and groins now indicate the commencement of the characteristic glandular swellings and carbuncles. In favourable cases, these swellings are of a bright-red colour; in the more dangerous, livid or purple. This first stage, which commonly lasts twelve hours, is followed by reaction, with increased restlessness, disturbed sleep, confusion of thought alternating with coma; the countenance retains its former expression, but the eye assumes a peculiar brightness, and the pupil is dilated. The pulse is hard and full; or very infrequent; or weak, fluttering, and intermittent; the tongue is dry, parched, of a yellowish colour, red in the centre and at the edges; then brown, cleft, and horny; the lips, teeth, and nostrils coated with dry sordes: there is constant nausea, with occasional vomiting of a blackish fluid; the evacuations from the bowels dark and offensive, and occasionally mixed with grumous blood; and hæmorrhage sometimes takes place from the nose.

In favourable cases, the crisis is by profuse perspiration and suppuration of the tumours; but in unfavourable ones, the skin remains harsh and dry; the pulse is small and fluttering; low muttering delirium and laborious breathing set in; the eye is sunk, the countenance wears a ghastly expression; the skin becomes covered with petechiæ and vibices; the buboes remain stationary; the powers of life give way, and death takes place without a struggle.

In the most favourable class of cases, the patient is able to go about his usual avocations, though suffering from the swelling of the glands. In the worst class of cases, the patient never recovers from the first shock to the nervous system, but sinks within 24 hours before the buboes have made their appearance.

CAUSES.—*Predisposing*. The same, probably, as in typhus fever.

Exciting.—A specific contagion. This is doubted by some authorities, but probably with as much reason as the contagiousness of typhus fever is called in question by others. The disease is endemic in Egypt, often spreads to the surrounding countries, and formerly prevailed in almost every part of Europe.

MORTALITY.—In Smyrna, during five months of 1834, out of 5,727 persons attacked, 4,831 died, and 907 recovered: 1 in 23 of the whole population suffered, and about 1 in 27 died; the deaths constituting 84 per cent. of the cases. (See Lib. and Cyclop. Pract. Med., Art. Plague.)

PROGNOSIS.—*Favourable*. The early formation of firm and moveable buboes passing rapidly into suppuration; profuse perspiration; an absence of severe fever; the survival of the patient beyond eight days.—*Unfavourable*. All the symptoms which would be deemed unfavourable in an attack of typhus fever.

TREATMENT.—That of typhus fever, with appropriate local applications to the buboes and carbuncles, among which prompt incisions are of great service. Mercury carried to salivation has been recommended, and, where salivation has taken place, seems to have been beneficial. The disease appears, however, to be almost equally fatal under all modes of treatment.

PROPHYLAXIS.—Strict separation from patients suffering under the disease, and avoidance of contact with clothing or furniture which has been used by them; and during the prevalence of the malady a more strict observance than usual of all the laws of health.

CHAPTER V.

Febris Infantum Remittens.	Infantile Remittent Fever.
Febris Hectica . . .	Hectic Fever.
Febres Puerperales . .	Puerperal Fevers.

FEBRIS INFANTUM REMITTENS—INFANTILE REMITTENT FEVER.

Synonyms.—Infantile gastric remittent—infantile hectic—worm fever—mesenteric fever—stomach fever—low fever of children—marasmus.

Generic Character.—A hectic fever due to local irritation, of which the bowels are the usual seat, and constipation the most common cause.

Symptoms.—Pallor, languor, drowsiness, and chilliness in the morning; flushed cheek, hot skin, restlessness, and the general symptoms of fever towards evening; followed at night by profuse sweating, and towards morning by a distinct remission. Skin dry; tongue moist, but coated; pulse frequent; appetite variable and capricious, or altogether wanting; urine scanty and high coloured, and depositing a whitish sediment; bowels costive or relaxed, or both alternately; the evacuations slimy and sour smelling, or highly offensive, dark, green, pitchy, or clay-coloured, with little or no bile, or with an abundant secretion of yellow bile; the abdomen tumid and often hot to the touch; the breath offensive; the skin extremely irritable, so that the child is constantly picking the nose, lips, corners of the eyes, fingers, and anus.

Such are the symptoms of a well-marked case of infantile remittent fever in its acute form. When less severe, the remittent character of the fever is less strongly marked; the chilliness and languor of the morning, and the febrile exacerbation of the evening being very indistinct, and the child merely looking pale and listless, and losing its appetite. Sometimes the disease becomes chronic, and is marked by paroxysms less intense but of longer duration; the abdomen becomes harder and more tumid, the tongue more loaded, the constipation generally present in the acute form is changed for a constant and distressing diarrhœa, the little patient wastes rapidly away, until at length the plump and rosy features of the child are changed to the meagre aspect of shrivelled old age. The more the child wastes away, the more restless and irritable does it become, till the last stage of debility arrives, when it dies from exhaustion, in a state of total unconsciousness, or with the mental faculties unimpaired to the very last. The disease may occur at any age, from one to two years up to puberty.

COMPLICATIONS AND TERMINATIONS.—A dry cough, and, if tubercles exist in the lungs, phthisis; enlargement of the cervical glands; torticollis; skin disease (strophulus); irritation of the brain, and sometimes hydrocephalus, dysentery, and tabes mesenterica.

MORBID APPEARANCES.—Inflammation, or ulceration of portions of the alimentary canal, especially of the small intestines. Enlargement, induration, or suppuration of the mesenteric glands. Traces of inflammation and its consequences in the brain or lungs.

DIAGNOSIS.—From hydrocephalus, by the absence of coma, strabismus, and convulsions; by the want of distension in the veins of the scalp, and the want of prominence in the fontanelles; by the absence of extreme heat of the head, and by the greater frequency of the respiration. In hydrocephalus, too, the bowels are more obstinately confined, and the urine more apt to be suppressed.

PROGNOSIS.—Generally favourable. In the ascertained absence of hydrocephalus, and of extensive disease of the mesenteric glands, the practitioner may safely hold out a prospect of recovery.—*Unfavourable.* When the mesenteric glands are diseased, and when, in spite of appropriate remedies, large quantities of sour, highly-offensive liquid fæces continue to be disharged day by day.

CAUSES.—*Predisposing.* All causes of debility, such as bad air, want of proper exercise, confinement within doors, and improper or deficient food.—*Exciting.* Irritation of the mucous membrane of the intestinal canal by accumulated fæces, or improper diet; worms; (the symptoms in this case are generally less strongly marked); diarrhœa; teething.

TREATMENT.—*Indications.* I. To remove all causes of irritation from the stomach and bowels.

II. To support the patient's strength.

III. To subdue local inflammation and remove local irritation.

I. The first indication is answered by—(a) strict regulation of the diet; (b) the continued use of purgative medicines.

(a) *Diet.*—As long as vomiting or diarrhœa is present, a strict farinaceous diet should be prescribed, or farinaceous food made with milk; as milk-gruel, arrowroot, or sago. In the absence of diarrhœa, rice-milk or bread-pudding, and, in cases of extreme debility, light animal broths or jellies may be prescribed. In young children, no animal food should be allowed. In children of one or two years of age, a still stricter diet is often necessary, and the quantity as well as the quality of the diet must be carefully regulated. At this early age, the stomach is apt to be peculiarly irritable, and to reject even the simplest farinaceous food. In such cases, give a large table spoonful of new milk from the cow every half-hour or hour. This simple and natural diet has restored many a child despaired of by those who think it necessary to give medicine in all diseases. The stomach wants rest, and the patient wastes away because it is not allowed to rest: it rejects food in ordinary quantity, and will bear none in any quantity but that which is natural to it at that early age.

(b) *Purgatives.*—When the bowels are costive, purgatives must be administered day after day, till the patient recovers. As the evacuations improve in character, the symptoms also improve, and when the bowels are restored to their natural state the patient is well; so entirely does this disease depend upon the state of the first passages. The choice of the purgative is not very important. A combination of one or two grains of calomel, with four or five grains of rhubarb or jalap, or equal quantities of the pulvis rhei and hydr. cum cretâ, may be given every night, or every other night, followed the next morning by a full dose of castor-oil. The calomel may be persevered in for weeks without bad effects, and in by far the majority of cases, with no fear of salivation. It is not necessary to produce violent action of the bowels; one or two motions a day will be enough, and hypercartharsis must be carefully avoided. If there is obstinate constipation, however, there is no fear of giving large doses of calomel, and repeating them at short intervals If diarrhœa exists at the outset, it may generally be removed in one or two days by the diet prescribed: if the diet is not sufficient, a single grain of hydrargyrum c. cretâ, with three or four grains of the pulvis cretæ comp. c. opio, given three times a day, will soon succeed in removing it. When the diarrhœa has ceased, but never before, purgatives may be resorted to, and continued every night, or every alternate night, followed by the castor-oil in the morning, until the patient is restored to health.

II. The patient's strength rarely requires support; pure air, proper exercise, and a nourishing and unirritating diet are the best restoratives. The proper ventilation of the bed-room or nursery is of the first importance. Should *tonics* appear necessary, the steel wine, in doses of a tea or dessert spoonful three times a-day, according to the age, or quinine in doses of from one to two grains, or the tonic infusions, will answer our purpose. But aperients are, in this disease, the best of tonics. The direct treatment of the existing debility by nourishing diet and stimulants, to the neglect of aperients, is a vulgar error against which it is necessary to warn the practitioner.

III. Depletion is rarely required in any form of infantile fever. If the brain, however, is much affected, the head hot, and the patient very restless, one or two leeches or more, according to the age, may be applied to the temples, but they are employed much more frequently than they are required. Cold to the head will generally suffice to subdue any inflammation that may be present. If the child is teething, the gums must be well lanced; if there are worms, they will be removed by the common purgatives already recommended; if there should be any irritation in the lungs, accompanied by mucus in the bronchial tubes, tartar-emetic in doses of $\frac{1}{10}$th to $\frac{1}{6}$th of a grain may be given according to the age, in combination with one or two grains of hydr. c. cretâ, three or four times a day: if the disease is complicated with dysentery, clysters of gruel may be frequently used; if the belly is hard and tumid, with enlargement of the mesenteric glands, much good may be derived from repeated friction with the hand or with a flannel moistened with olive-oil; if the cervical glands are enlarged, they may be covered with a small piece of the emplastrum hydrargyri c. ammoniaco. This simple application is to be preferred to the tincture of iodine.

Tabes mesenterica requires the same treatment as the infantile fever, of which it is a frequent consequence. Strict diet, purgatives, if there is no diarrhœa, emollient clysters, frequent frictions to the abdomen, and tonics—when they do not displace these more important remedies—constitute the treatment.

FEBRIS HECTICA—HECTIC FEVER.

DEFINITION.—A remittent fever, arising from local irritation in a weakened constitution.

SYMPTOMS.—A sense of chilliness, succeeded by flushings terminating in a hot skin and frequent pulse, and these by perspiration, constitute the paroxysm of hectic fever. There are commonly two such paroxysms or exacerbations in the twenty-four hours. The first occurs generally about noon, and abates mostly in from four to five hours; this remission is but of short duration; a more violent exacerbation soon follows, which keeps increasing in violence until morning, when, about two o'clock, a perspiration breaks out that resolves the paroxysm.

The pulse during the exacerbations is generally quick and frequent, ranging from 96 to 130, or even more; the urine is high-coloured, and deposits a lateritious sediment; the cheeks are flushed, and have a florid circumscribed redness; there is burning heat in the palms of the hands and soles of the feet: in the periods of remission, the pulse is mostly reduced in frequency, but seldom so low as in health; the appetite is not much impaired; the tongue is clean, moist, and red. The patient rapidly loses flesh.

At length the fever becomes more continued, and the exacerbations more violent; the appetite falls off; colliquative sweats alternate with diarrhœa; and under an increased severity of these symptoms, and those of the disease which causes the hectic fever, the patient sinks.

Diagnosis.—From simple idiopathic remittent fever by the pre-existence of local disease.

Prognosis.—Favourable or unfavourable according to the nature of the local disease, of which it is the effect and symptom.

Causes.—This fever is generally supposed to arise from the formation of matter, or its absorption from large surfaces, as in suppuration of the lungs, liver, hip-joint, &c. But it may arise from any local irritation in debilitated constitutions, even when no suppuration exists. The infantile fever which arises in weakened constitutions from irritation of the alimentary canal is but one form of hectic; and the disease is often present in the early stage of phthisis pulmonalis, before there is any reason to believe that suppuration has taken place. It is in advanced stages of this disease that hectic fever is developed in its most characteristic form.

Treatment.—This must depend on the disease of which the hectic fever is symptomatic. If there is no apparent disease to produce the hectic symptoms, the treatment must be that of debility, and the sulphate of quina will be the appropriate remedy. A course of sarsaparilla, with a milk or vegetable diet, now and then removes a hectic fever, the cause of which is not apparent.

FEBRES PUERPERALES—PUERPERAL FEVERS.

Under this designation authors have described several forms of disease, differing in many of their characters, but agreeing in the general feature of combining a well-marked febrile affection with a local disease varying in seat, character, and intensity. The following distinct forms are recognised by authors:—

1. **Acute puerperal peritonitis.**
2. **Adynamic, or Malignant puerperal fever.**
3. **Puerperal intestinal irritation.**
4. **False puerperal peritonitis.**
5. **Milk fever.**

ACUTE PUERPERAL PERITONITIS.

SYMPTOMS.—Severe rigor, commencing on the second, third, or fourth day after delivery, and in some cases much later; followed by acute pain in the abdomen, and generally in the hypogastric region. The pain is constant, augmented at intervals, increased by pressure, and by motion, and accompanied by fulness and tension of the abdomen. The secretions, especially the milk and lochia, are checked; the skin is hot; the pulse sometimes frequent, small, and wiry, at others full and bounding; the tongue furred. There is headache, restlessness, and sleeplessness, with anxious and suffused countenance, occasional vomiting, and hurried respiration. In unfavourable cases, the pain and tension of the abdomen increase, and it feels hard and tympanitic; the pulse becomes more and more rapid, the skin cold and clammy, the head first feels confused, and then muttering delirium follows; the tongue becomes dry and brown, the teeth covered with sordes; distressing eructation and vomiting, hiccough, subsultus tendinum, facies Hippocratica, and cold extremities usher in the fatal result.

MORBID APPEARANCES.—Redness of the peritoneum, especially of that covering the uterus and its appendages, or lymph effused into its cavity. The uterus, ovaries, and Fallopian tubes covered with a creamy matter. Purulent deposits sometimes found in the muscular structure of the uterus; ovaries often disorganized.

CAUSES.—Contagion. The common causes of inflammation. It is often epidemic, and coexists with or precedes the malignant variety.

PROGNOSIS.—*Favourable*, but guarded, if the treatment is commenced early, and if the reigning epidemic is of a mild character.

TREATMENT.—*Indications.* I. To reduce inflammatory action. II. To remove local irritation.

I. Prompt treatment is required.—Bleeding in the erect or semi-erect posture, to the approach of syncope, or leeches in large numbers to the abdomen, according to the severity of the symptoms and the strength of the patient; and to be repeated if necessary; hot fomentations to the abdomen; calomel in doses of five grains, in combination with half a grain of opium, or five grains of Dover's powder, every two, three, or four hours, continued till salivation takes place. Cooling drinks and cool air. When there is much debility, nourishing food and stimulants, as wine, brandy, and ammonia, or turpentine, taken by the mouth, and in the form of injection.

II. A purgative of castor-oil, or salts and senna, to be administered at the outset, and to be followed up at short intervals, so as to keep the bowels open. Warm-water injections thrown up into the rectum and vagina.

If swelling, tension, and tenderness of the abdomen continue after the antiphlogistic remedies have been carried to their full extent, a blister may be applied to the abdomen, and dressed with mercurial ointment, or the abdomen may be fomented with hot turpentine.

ADYNAMIC, OR MALIGNANT PUERPERAL FEVER.

Symptoms.—More obscure than the foregoing: the rigor less strongly marked, the pain in the abdomen less severe, little increased by pressure, deeper-seated, more circumscribed, and often limited to the hypogastric or iliac regions. The pulse, from the first, extremely small, rapid, and weak, ranging from 130 to 160; countenance anxious and sunk, skin of a livid yellow tinge; extreme restlessness; intellect, though sometimes clear to the last, generally wandering; low, muttering delirium; tongue at first white, then dirty yellow, then dry and brown; if blood is taken, its colour is dark, and the coagulum very loose; eructation, vomiting, hiccough, diarrhœa; the evacuations highly offensive; lochial discharges fetid and often suppressed; breasts flaccid; abdomen tumid and tympanitic. Death after the usual typhoid symptoms, or slow recovery.

Morbid Appearances.—Peritoneum of a dusky colour, the effused fluid dirty, brown, often bloody, and very glutinous, and mixed with shreds of lymph. Fetid gas in the intestines. Uterus disorganized, softened, or gangrenous; ovaries broken down and reduced to a pulp. Pus in the veins of the uterus, and in the joints; inflammation, and abscess of the cellular membrane of the leg, &c. In a few cases, a remarkable destruction of the eye.

Cause.—Contagion.

Prognosis.—*Unfavourable* in all cases; chances of recovery slight.

Treatment.—*Indications.* I. To reduce local inflammation at the least sacrifice of strength. II. To remove local irritation. III. To support the patient's strength.

I. Bloodletting, if employed at all, must be used with great caution. The hand must be kept on the pulse, and the effect carefully noted. If the pulse increases in fulness and force after the abstraction of a small quantity of blood, it may be allowed to flow more freely. Calomel, in doses of from three to five grains, every two or three hours, with half a grain or a grain of opium; or calomel in combination with three or four grains of ipecacuanha, or equivalent doses of James's powder or tartarized antimony. Hot fomentations, hot turpentine, or blisters to the abdomen.

II. The bowels to be kept open by occasional doses of castor oil, and warm water to be injected, from time to time, into the rectum and uterus.

III. Nourishing diet, ammonia, spirituous stimulants, oil of turpentine, &c.; and the treatment proper to the typhoid form of fever.

PUERPERAL INTESTINAL IRRITATION.

SYMPTOMS.—General uneasiness, coming on at any period after delivery, if the bowels have been neglected; loss of appetite; tongue furred; chills alternating with flushes; headache; frequent pulse; abdomen large and rather tense; slight, deep-seated pain, relieved by steady pressure; nausea and vomiting of a dark and offensive fluid; diarrhœa; evacuations dark, fetid, watery, or slimy; flatulence; fetor of breath. In unfavourable cases, the exacerbations of fever become more severe and of longer duration, and attended with extreme debility and despondency; there is the red tongue of acute gastric irritation; the mucous membrane of the tongue and mouth is often covered with aphthæ. The diarrhœa continuing and the strength diminishing, the febrile symptoms become more constant and severe, and the disease gradually assumes the shape of the malignant puerperal fever.

MORBID APPEARANCES.—Generally none. Sometimes inflammation with or without ulceration of the mucous membrane of the intestines. When the disease towards its termination assumes the form of the foregoing species, the morbid appearances are those proper to each species.

PROGNOSIS.—Generally favourable, if promptly treated; unfavourable if neglected.

TREATMENT.—*Indications*. I. To remove the offending matter from the bowels. II. To support the strength.

I. The first indication is fulfilled by a full dose of calomel and opium, followed, after an interval of two or three hours, by castor-oil or the senna draught. The effect on the bowels may be kept up by calomel in doses of from three to five grains every three or four hours, and enemata of warm water may be administered from time to time.

II. The second indication is fulfilled by the usual tonic or stimulating remedies, and nourishing diet.

If the disease runs into either of the foregoing, the remedies appropriate to that form of the disease must be employed.

FALSE PUERPERAL PERITONITIS.

SYMPTOMS.—After a slight rigor, pain and tenderness of the abdomen, a slightly-coated tongue, a rapid and very compressible pulse; temperature of the skin but little increased; expression of the countenance free from anxiety; strength much less impaired than in the other forms. It is most apt to occur in delicate and nervous females, and after unusually severe after-pains, or after the violent operation of a purgative.

Prognosis.—Favourable.

Diagnosis.—From true puerperal peritonitis by the milder character of the symptoms, and by the unfavourable effect of bloodletting.

Treatment.—Fomentations, poultices, diaphoretics, and opiates, with an occasional mild laxative. Ten grains of Dover's powder, or from 20 to 30 drops of laudanum, may be given at once, and repeated at suitable intervals if attended with benefit.

There is a form of puerperal fever of occasional occurrence, and characterised by symptoms similar to those of false peritonitis, but with the addition of profuse perspiration, and frequently of diarrhœa, with nervous excitement and violent palpitations of the heart. This is called Hidrosis or Hidrotic fever. The therapeutic indications are —I. To remove local irritation; and II. To support the strength. For this latter purpose, quinine, or stimulants in combination with opium, may be employed.

MILK FEVER.

Symptoms.—After well-marked rigor, occurring about the third day after delivery, great pain and throbbing in the head; intolerance of light and sound; flushed countenance; contracted pupils; conjunctiva injected; pulse frequent, full, and hard; skin hot and dry; thirst excessive; tongue dry and coated. If the symptoms are not speedily relieved, the secretion of milk is suppressed; the breasts become flaccid; the head symptoms more severe; and delirium sets in.

Causes.—Heated atmosphere, undue exertion, mental agitation.

Diagnosis.—From other fevers occurring in puerperal women by the great disturbance of the circulation, with the strong determination to the head.

Indications.—I. To reduce arterial action. II. To promote the secretion of the milk.

I. Arterial action may be subdued, in slight cases, by aperient medicines, with salines and tartar emetic in small doses, by antiphlogistic diet, rest of mind and body, cool air, and warm diluent drinks. In more severe cases, bloodletting in a full stream, and repeated if necessary, followed by tartar emetic in full doses, and brisk mercurial purgatives. Cupping, or leeches to the temples, and cold lotions or ice to the head, according to the severity of the head symptoms.

Hot water to the feet, and, in severe cases, mustard poultices to the legs.

II. To fulfil the second indication, the milk should be gently drawn off, and the breast be fomented or poulticed. The child should also be occasionally applied to the breast, with a view of re-exciting the secretion.

GENERAL OBSERVATIONS ON PUERPERAL FEVER.

The diseases which are usually characterised by the term Puerperal Fever, are the first two of the present group—acute puerperal peritonitis, and adynamic or malignant puerperal fever. Both these diseases have been observed in different epidemics; and cases of both forms occur in the same epidemic; just as continued fever, in one year takes the shape of synocha, in another of typhus, whilst in a third, cases of both are observed to occur at the same time. In the mode of commencement, too, there is an analogy between puerperal fever and common continued fever. The first stage of congestion sometimes assumes so marked a character in both as to give the disease the name of *congestive*; in like manner the stage of reaction may be so strongly marked, as to gain for the fever the name of *inflammatory*; or the symptoms, from the first, may be accompanied by that extreme debility and nervous depression which is characteristic of the *typhoid* state. These strong analogies, added to the acknowledgedly contagious character of both diseases, lead to certain general views which have an important bearing on the treatment. It is only by recognising in these different forms the same essential disease, varying with the season, and "epidemic constitution," on the one hand, and with individual peculiarities on the other, that the treatment of the disease can be conducted on rational and safe principles. In this disease, more than in most others, it will not do to treat a name, to place reliance upon any approved prescriptions, or to follow implicitly the experience of any single epidemic. Puerperal fever, like continued fever, must be treated on general principles: reaction must be brought about by prompt measures when congestion exists; inflammation must be subdued by depressing remedies, when the disease takes on the inflammatory character; severe nervous symptoms and acute neuralgic and muscular pains must be met by full doses of opium; local complications must be treated with as little expense of blood and strength as possible; and the strength must be carefully supported by nourishing food, and the liberal use of alcoholic stimulants, when the typhoid character prevails from the first, or supervenes in the course of the disease.

CHAPTER VI.

Scrofula	King's Evil.
Rachitis	Rickets.
Mollities Ossium	Softening of the bones.
Purpura Hæmorrhagica	Land-scurvy.
Purpura Nautica	Sea-scurvy.
Rheumatismus	Rheumatism.
Podagra	Gout.

SCROFULA—KING'S EVIL.

Synonym.—Struma.

Definition.—A peculiar state of constitution, characterised by want of power and tone, the deposit of *tubercle* in several organs of the body, and a tendency to indolent inflammatory swellings and chronic ulcers.

The most common forms of scrofulous disease are, chronic inflammation and suppuration of the glands of the neck, strumous ophthalmia, porriginous diseases of the scalp, pustular eruptions about the ears and mouth, indolent abscesses of the skin, chilblains, enlarged tonsils, mollities ossium, diseases of the bones and joints, psoas abscess, tabes mesenterica, and pulmonary consumption. The scrofulous, too, are more subject than others to hysteria and to mental disorders.

The form of scrofula to be described in this place is that which attacks the absorbent glands of the neck. Other scrofulous affections will be treated of elsewhere in these pages (see Rachitis, Tabes Mesenterica, Phthisis Pulmonalis, and Strumous Ophthalmia), or in works on Surgery to which they properly belong.

Symptoms.—Scrofula most commonly affects children of a lax habit of body, with a smooth soft skin, delicate rosy complexion, fair and fine hair, large blue eyes, with long silky eyelashes; full upper lip, and tumid septum and alæ nasi. A less common combination is the dark hair and olive complexion. It is also apt to attack spare, pale children, with projecting foreheads, misshapen heads, narrow and deformed chests, swollen fingers, enlarged joints, irregular and unsound teeth, and tumid abdomens. The most constant mark of the scrofulous diathesis is the thick upper lip. In addition to these marks of the scrofulous diathesis, may be mentioned a languid circulation, a slow and weak pulse, cold extremities, and great liability to chilblains. A weak digestion, variable appetite, and torpid or disordered bowels are also of frequent occurrence in scrofulous children. The subjects of this disease often display great acuteness and aptitude, with lively imaginations and ardent affections, and not unfrequently a great precocity of intellect.

The scrofulous affection of the glands of the neck first appears as a slight swelling of one or more of the glands of one or both sides of the neck, especially of those which are situated beneath the lower jaw. The tumour is even to the touch, moveable, not tender, nor marked by any inflammation of the skin which covers it. Sometimes the swollen gland or glands will remain in this state without perceptible change for weeks, months, or even years; sometimes they undergo a very gradual enlargement; sometimes they coalesce, so as to form irregular knotty swellings; sometimes, under proper treatment, they gradually disappear.

In a large proportion of cases they proceed to suppuration. The glands increase in size; the skin covering them, and the cellular membrane surrounding them, become thickened and inflamed; so that they become less moveable, and more tender to the touch. At length fluctuation is perceived, the tumour points, and unless relief be given by the knife, discharges through a single opening, or by several small apertures, pus, followed by a sero-purulent, mixed with a curdy or cheesy, matter. The abscess thus formed is very slow to heal, has an unhealthy appearance, with hard, swollen, irregular edges, of a dull red colour, and an uneven base, clogged with curdy matter. When the ulcer heals it leaves a very irregular and unsightly scar. Though the superficial absorbent glands of the neck are those most frequently attacked, the deeper-seated glands are often implicated; and the disease sometimes spreads along the course of the absorbents from one gland to another.

The constitutional disturbance which accompanies these local changes is often slight. The patient retains his colour, does not lose flesh, and has every appearance of good health. In other cases, the departure from health is slight, consisting in general languor, slight emaciation, defective or uncertain appetite, cold extremities, and languid circulation. When the local disease, however, is very extensive, and suppuration has set in, symptoms of hectic fever, of greater or less severity, show themselves, with great debility and emaciation. In advanced stages of the disease, especially in the case of young adults, pulmonary consumption is apt to supervene; and the two diseases run on together until they destroy the patient.

CAUSES.—*Predisposing.* Hereditary taint; syphilis or gout, or a shattered constitution in one or other of the parents; disparity of age in the parents, or too near relationship; childhood, youth, and the early adult age. The disease is of most common occurrence between the third and seventh year; it is comparatively rare after puberty, but may occur as late as thirty years of age.

Exciting.—All causes of debility acting on the predisposed—such as sedentary habits of life; scanty and unwholesome food; the impure air of crowded and ill-ventilated nurseries, schools, workshops, and factories, and the confined rooms inhabited by the poorer classes in towns; want of cleanliness; over-work; bad water; damp and low situations; the seasons of winter and spring; exhausting maladies, especially fever and the febrile exanthemata. The immediate exciting cause is often an attack of catarrh.

DIAGNOSIS.—From simple glandular inflammation by the indolent character of the swellings. From malignant diseases of the same parts, by the early age at which scrofula sets in, and by the peculiar appearances just described.

PROGNOSIS.—The disease is rarely fatal of itself, but is apt to be associated with other scrofulous affections, which may destroy life, such as tabes mesenterica in childhood, and white swelling of the joints and pulmonary consumption in the young adult. It is slow and tedious in its course, and its duration very uncertain.

POST-MORTEM APPEARANCES.—The glands themselves contain a soft curdy matter. The other viscera of the body, especially the mesenteric glands and the lungs, contain tubercular deposits. Scrofulous disease of the joints and bones is also not of uncommon occurrence.

TREATMENT.—*Indications.* I. To improve the general health. II. To promote the absorption or dispersion of local tumours, and the healing of ulcers.

I. The first indication may be fulfilled by—

A nutritious diet, adapted to the age of the patient, with a due allowance of animal food. The use of animal food, however, is not always indicated, and frequently does irreparable mischief, especially in very young children, and in the subjects of tabes mesenterica. During the stage of suppuration, a more generous diet will be necessary, and wine and malt liquors in moderate quantity may be given with advantage. In scrofulous infants brought up by the hand, the substitution of the mother's milk, or pure milk from the cow.

Daily exercise, short of fatigue.

Warm clothing (flannel or woven cotton next the skin, avoiding over-clothing).

Change of air, especially from a low damp situation to a high, dry, and bracing air. Sea-air and sea-bathing in the summer and autumn months.

Daily ablution of the skin with cold or tepid water, followed by friction with a rough towel. The shower-bath once or twice a-week, and an occasional warm bath, to insure perfect cleanliness, and an open state of the pores of the skin.

The state of the bowels must be carefully attended to, and gentle aperients must be administered at short intervals. A few grains of rhubarb, with small doses of hyd. c. cretâ, given every night, or every other night, followed by a tea or dessert-spoonful of castor-oil the following morning, is a good form of purgative.

If the patient suffers from heartburn and other symptoms of indigestion the aperients may be combined with alkalis, such as the carbonates of magnesia or soda; or the liq. potassæ may be given in any of the tonic infusions.

Tonics, of which the preparations of *iron* are to be preferred, especially when the patient is habitually pale and languid. The vinum ferri, the tinctura ferri sesquichloridi, the ammonio-chloride, the citrate and ammonio-citrate, and the dried sulphate, are suitable preparations. Decoction of bark, or quinine, may also be given as tonics. Quinine and iron in combination may also be used.

Iodine in the form of iodide of potassium (one to three grains three times a-day in some tonic infusion), or the same in combination with some of the liquid preparations of iron, or the iodide of iron in doses of from one to three grains, three or four times a-day.

The decoction of sarsaparilla may be given at the same time with the tonic medicines.

Cod-liver oil (a tea-spoonful three times a-day, gradually increased to a table-spoonful) is a valuable remedy in scrofula.

Occasional symptoms must be met by appropriate remedies in smaller doses than in patients of more robust constitution. As a general rule, general and local abstractions of blood, and all lowering measures must be carefully avoided; but leeches in small numbers may be occasionally necessary in that condition of the swellings in which there is reason to hope that by keeping down the inflammation of the skin, suppuration may be prevented.

II. Simple enlargement of the glands of the neck may be treated by the constant application of the emplastrum ammoniaci c. hydrargyro, or they may be painted frequently with the tinctura iodinii. If the patient is at the sea-side, poultices of sea-weed (the fucus vesiculosus) may be kept constantly applied. When suppuration takes place, it must be encouraged by poultices, and the matter be let out by a small vertical or oblique incision. Caustic should never be used for this purpose, as it leaves behind it unsightly scars.

Open scrofulous ulcers generally put on an indolent character, and must be treated by local stimulants, and in extreme cases by caustics. In the treatment of other local affections occurring in scrofulous habits this peculiarly indolent character must be borne in mind.

REMEDIES.—*Mercurial preparations, given as alteratives,* such as Plummer's pill, or the bichloride of mercury with sarsaparilla (Hydrarg. bichloridi, gr. $\frac{1}{25}$; decoct. sarzæ ℥iss, or syrupi sarzæ ʒi, three times a-day). The decoctions of sarsaparilla, guaiacum, sassafras, and mezereon. Medicines containing iodine in small quantities; of which the one most in repute is the burnt sponge in doses of ʒi to ℥ss. *Alkalis and alkaline earths,* of which the best is the liquor potassæ, in doses of from five to twenty drops, three times a-day, in some tonic infusion; or lime-water in doses of from one to two drachms. *The mineral acids*, especially the nitro-muriatic acid. *The chlorides of Barium and of Calcium.* (Liquor barii chloridi, ♏iii to ♏v, cautiously increased; or Liquor calcii chloridi, ♏xxx to ♏xl gradually increased. *Extract of Conium.*

From the slow progress and uncertain march of scrofulous affections, it is to be expected that many remedies will seem to be serviceable, which are really inert. In this respect scrofula resembles pulmonary consumption. Remedies of the most opposite natures are confidently recommended, and alleged to prove efficacious.

RACHITIS—RICKETS.

Definition.—A distortion of the bones, occuring in infancy and childhood, from a deficiency of earthy matters, and of the more essential animal matters of the bony structure.

Symptoms.—The disease sometimes begins soon after birth; more frequently when the child is five or six months old; more frequently still before the close of the second year. After this time it is a very rare occurrence. When the disease first sets in, the child is observed to be less healthy and strong than children of the same age. The face is pale, and the body emaciated. Teething begins late, goes on slowly, and the teeth soon become loose and carious; the fontanelles and sutures are usually open, the head, though smaller than usual, is generally large in proportion to the face, and the forehead prominent; the chest flattened at the sides, and the sternum projecting: the epiphyses of the long bones become spongy, and the joints swell This enlargement of the joints is commonly first perceived in the wrists and ankles. As the disease advances, the long bones yield to the weight of the body, and are twisted by the action of the muscles; the spine becomes curved and twisted; and the pelvis is distorted and narrowed. If the patient has begun to walk, his gait is unsteady and waddling. The mental faculties are in general unimpaired, and even more acute than in children of the same age. This observation, however, does not apply to those cases of cretinism of which distortion of the bones forms a part.

Causes.—*Predisposing.* Hereditary predisposition. A peculiar diathesis; allied, perhaps, to the scrofulous diathesis, but not identical with it, inasmuch as neither enlargements of the cervical glands, nor tuberculous deposits in the lungs, are of common occurrence in rickety subjects.

Exciting.—Bad nursing, bad food, bad air, want of cleanliness.

Pathology.—Defective nourishment, or mal-assimilation of the food, leading to a deficiency of earthy matter in the structure of the bones, and to a deficiency or entire absence of chondrin and gelatine.

PROGNOSIS.—Favourable. The disease is very rarely fatal. In mild cases complete recovery often takes place; the swollen joints gradually returning to their natural size: in severe cases the distortion of the body is permanent, but the bones ultimately resume their normal composition, and even become more dense and compact than in persons originally healthy.

TREATMENT.—*Indication.* To preserve and improve the general health by every possible means. By food of good quality and adapted to the child's age; by substituting the mother's milk, or new milk from the cow, for other food in infants brought up by hand; by fresh and pure air, cleanliness, exercise in the open air, cold or tepid salt-bathing, and frequent frictions. Also by tonics, especially preparations of steel, such as steel-wine, in doses of a tea or dessert-spoonful, three or four times a-day, or the sulphate or potassio-tartrate of iron in full doses. Cod-liver oil in doses of from a tea-spoonful to a table-spoonful three times a-day, may also be prescribed with advantage. Children living in large towns should be removed to the country. Careful attention to the state of the bowels. The distorted limbs must be artificially supported by padded splints, or such other mechanical contrivances as do not interfere with the proper action of the muscles; and care should be taken not to allow the weight of the body to rest on those parts which show a tendency to swell or bend.

MOLLITIES OSSIUM—SOFTENING OF THE BONES.

SYNONYMS.—Osteo-malacia. Atrophy of bone.

SYMPTOMS.—The symptoms of this disease are very obscure, and its presence is rarely recognised till it has made considerable progress. Severe pains in the pelvis and lower extremities of long continuance, and considered as rheumatic pains, have been present in the greater number of cases; but the presence of the disease is generally recognised for the first time by a fracture occurring in one of the bones of the extremities by the application of some very slight force, or by the bending, twisting, or distortion of one or other of the limbs; or, in females, by the increasing difficulty of parturition, arising from a growing distortion of the pelvis.

ANATOMICAL CHARACTERS.—The cancelli of the bone completel absorbed, and the bone reduced to a mere shell, filled with medullary matter. The bones so softened as to admit of being cut with a knife. The periosteum sound. The teeth not implicated.

Causes.—*Predisposing.* The female sex. Comparatively rare in men. The adult age.

Exciting.—Obscure.

Diagnosis.—From rachitis by the age at which it occurs; rachitis being a disease of infancy and childhood, mollities ossium of adult age.

Prognosis.—Unfavourable; but the progress of the disease is often slow.

Treatment.—As the true cause of the disease is very obscure, there is no ascertained remedy, or mode of treatment on which reliance can be placed. The treatment will, therefore, have to be directed to the improvement of the general health, by nourishing diet and tonic remedies, with such other medicines as are indicated in the existing state of system.

PURPURA—SCURVY.

Synonyms.—Hæmorrhœa petechialis. Petechiæ sine febre.

Varieties.—1. *Purpura simplex;* 2. *Purpura hæmorrhagica,* or land-scurvy; 3. *Purpura nautica,* or sea-scurvy.

1. Purpura simplex.

Symptoms.—After slight uneasiness, or trifling giddiness, an eruption of small round patches, of a dark-red colour, chiefly on the thighs and legs, but sometimes extending over the whole body. After a few days, the first patches begin to fade, and new ones appear. There is little disturbance of the general health. The disease may last from three or four weeks to as many years.

Causes.—*Predisposing.* Peculiarity of constitution, debility.

Exciting.—Febrile states of system. It is often attributed to cold.

Diagnosis.—From other forms of skin disease, by the shape and colour of the spots, and the uninjured state of the cuticle.

Prognosis.—Favourable.

Treatment.—A nourishing *mixed* diet, and proper exercise, to give tone to the system; with tonic medicines, and occasional mild aperients. If the disease do not yield to this treatment, the same remedies, with small bleedings from the arm, to promote the absorption of the effused blood.

2. PURPURA HÆMORRHAGICA—LAND-SCURVY.

SYMPTOMS.—Debility, weariness, inaptitude for bodily or mental exertion, pains in the limbs, petechiæ of larger extent than in the foregoing variety; occasionally bullæ filled with liquid blood; gums swollen, livid, and spongy; hæmorrhages from the gums, nostrils, and mucous membranes generally; rigidity of the legs from effusion of blood into the texture of the muscles; extensive bruises; pulse feeble, but variable in frequency; in some cases, full and hard. In the more severe cases, all the symptoms of the sea-scurvy.

RATIONALE.—A febrile state of system, with a relaxed and weakened state of the capillary vessels; or general debility, combined with the same condition of vessels.

CAUSES.—*Predisposing.* Moist atmosphere, impure air, want of personal cleanliness, and the general causes of debility.

Exciting.—A diet deficient in nutriment, consisting chiefly of one kind of food, or wanting a due admixture of vegetable acid.

TREATMENT.—If the pulse be full and hard, bleeding from the arm to the extent of ten or twelve ounces is indicated, followed by tonics and a generous, nutritious, and *mixed* diet. When there is great debility, depletion is contraindicated, and tonics and stimulants with a generous diet must be prescribed. A table-spoonful of lemon-juice may be given with advantage three or four times a-day. When purpura hæmorrhagica breaks out in prisons or workhouses, minute inquiries should be made as to the diet of the inmates. It sometimes happens that, though the diet is not deficient in quantity or in the quality of the articles of which it consists, it is wanting in the essential element of such fresh vegetables as contain a vegetable acid. For instance, scurvy has been traced in one case to the substitution of rice, which does not contain such an acid, for the potato, which does contain it; and the restoration of the potato sufficed to banish the disease. As the cheapest of vegetables containing a free acid, potatoes should always form part of the ordinary diet of prisons, workhouses, and hospitals.

3. PURPURA NAUTICA. SCORBUTUS—SEA-SCURVY.

SYMPTOMS.—Heaviness, weariness, dejection of spirits, aversion to exercise, dull pains in the limbs, especially during the night; anxiety and oppression at the præcordia; palpitation and shortness of breath on the slightest exertion; the countenance pale, sallow, and bloated; the skin in some cases hot, in others cold and contracted; the pulse in some cases infrequent, in others small and frequent; the tongue clean, moist, and pale; the gums swollen, spongy, and livid, bleed upon the slightest touch, and at length separate from the teeth, which become loose; the breath offensive; petechiæ and maculæ appear on various parts of the body; the slightest scratch degenerates into a foul and ill-conditioned ulcer; the slightest pressure produces a bruise, and old cicatrices open afresh, and discharge a thin sanious fluid; spontaneous ulceration likewise takes place upon the gums and upon the surface of the body; the joints become swelled and stiff; the muscles of the legs, and the muscles of the calf especially, rigid, contracted, and exceedingly painful; the bowels are either obstinately constipated, or there is diarrhœa; the urine, when not tinged with blood, is transparent, high-coloured, and acid; great emaciation ensues; passive hæmorrhages take place from the gums, nose, and ears, from the stomach and bowels, and occasionally from the lungs and bladder; all the excretions become intolerably fetid; still, however, the appetite frequently remains entire, the patient retains his intellectual faculties, talks with a loud voice, but is apt to faint on the slightest motion; and many patients have expired as they were being carried from their hammocks. Sudden death has also often taken place in the earlier stage of the disease, from some violent effort of the patient.

CAUSES.—*Predisposing.* A cold moist atmosphere; the winter season; cold climates; fatigues and hardships; preceding attacks of illness; a previous attack of scurvy; indolence; depressing passions, and the general causes of debility; scanty supplies of water; deficient clothing; want of cleanliness; impure air.

Exciting.—A diet restricted to a few articles of food, as salt meat and biscuit; a deficiency of vegetable food, and especially of such vegetables as contain vegetable acids.

DIAGNOSIS.—*From malignant fever.* By the absence of feverish symptoms; by the intellectual faculties being little impaired; by the disease coming on more gradually, and continuing a much longer time; by the circumstances under which it occurs; by its not being contagious. Between this disease and *Purpura hæmorrhagica* there is no essential difference. The scurvy, as it formerly occurred on land, in besieged cities, in camps, and in monasteries, and occasionally among entire populations, and as it now shows itself from time to time in prisons and workhouses, is essentially the same disease as when it occurs at sea. Purpura hæmorrhagica and purpura nautica have been treated under distinct heads for convenience sake.

PROGNOSIS.—This will be drawn from the severity of the disease, and the situation of the patient with respect to vegetable diet, or other proper substitute.

Favourable circumstances.—The constitution not having been weakened by previous disease; little reduction of strength; moist skin; bilious diarrhœa; the patient being still capable of moving about; infrequent pulse; the petechiæ, if any appear, being of a bright red colour; the absence of ulceration.

Unfavourable.—Great prostration of strength; extreme oppression at the præcordia; redness of the eyes, flushed countenance; a rapid weak pulse; profuse hæmorrhages; petechiæ and maculæ of a dark livid colour, and of great extent; fetid and involuntary evacuations.

TREATMENT.—*Indications.* I. To supply what is wanting in the diet. II. To palliate urgent symptoms.

I. The first indication is fulfilled by the use of—

Fresh vegetables of every description; the ascescent fruits, as the orange, the lime, and the lemon; fermented and fermenting spirituous liquors, as ale, cyder, and spruce beer; and the light French and German wines. Where great debility is present the stronger spirits may be given, in combination with a vegetable acid, as in punch.

Occasional aperients of infusion of tamarinds, cream of tartar, or the sulphates of soda and magnesia may be given, and the utmost attention must be paid to cleanliness and ventilation.

II. The second indication—

Ulcerations of the gums require astringent gargles of alum, muriatic acid, chloride of soda or lime, decoction of bark, or the steam of vinegar. *Acute pains* are relieved by opium; *oppression at the chest, and difficulty of breathing*, by diffusible stimulants, such as nitric and sulphuric æther with camphor; *contractions of the muscles of the legs*, by hot fomentations of vinegar and water, or emollient cataplasms, and by friction; *scorbutic ulcers* upon the surface of the body by slightly stimulant applications.

PROPHYLAXIS.—A due admixture with the food of such fresh or preserved vegetables as contain vegetable acids, or, where fresh or preserved vegetables cannot be procured, lemon-juice or citric acid. Among fresh vegetables, the potato is one of the best. As a moist atmosphere is undoubtedly injurious, dry rubbing should be substituted for frequent washing in our ships. Cleanliness and ventilation should also be rigidly enforced; and where men are placed in circumstances favourable to mental inaction and despondency, such employments and amusements as may tend to counteract these states of mind.

RHEUMATISMUS—RHEUMATISM.

SPECIES—1. Acute. 2. Chronic. 3. Muscular.

1. RHEUMATISMUS ACUTUS—RHEUMATIC FEVER.

DEFINITION.—Acute inflammation of the larger joints, accompanied by well-marked febrile symptoms; the inflammation often shifting from joint to joint, and, in many cases, attacking the fibrous textures of the heart.

SYNONYMS.—Acute rheumatism—acute articular rheumatism—acute arthritis.

SYMPTOMS.—Lassitude and rigors, succeeded by a full, frequent, and quick pulse, and all the usual symptoms of inflammatory fever; with sense of weight and coldness of the extremities, and great restlessness. After a short time (in the course of one, two, or three days), inflammation with redness of the surface supervenes, and acute pain, extreme tenderness, tumour, and tension, in one or more of the larger joints of the body. The pulse ranges from 90 to 120; and is full, hard, and jerking; the blood, when drawn from a vein, exhibits the inflammatory surface or buffy coat; there is loss of appetite and great thirst; the tongue is coated with a white fur; the body is usually obstinately costive; the urine high-coloured, and without sediment; and the skin often bathed in a profuse acid-sweat, which, however, affords no relief.

The febrile symptoms and the pain generally suffer an exacerbation at night. The disease is rarely confined to the joints first attacked; but after continuing in them some hours or days, it attacks fresh joints, sometimes continuing unabated in those first affected, at others leaving them quite free from pain or swelling. In rarer instances, it returns to the joints which were first affected, and ultimately extends to all the large joints of the body. Some amendment usually takes place at the end of about a fortnight; the pain lessens, especially at night; there is less fever, and less perspiration; the urine is more abundant and is sometimes charged with lateritious deposits; the appetite returns; the thirst diminishes; the pulse falls; and the patient's movements become more free. Convalescence, however, is rarely uninterrupted, and the affection of the joints often assumes a chronic form.

Such are the symptoms when the disease is confined to the joints; but, in a large proportion of cases, it extends to the fibrous tissues of the heart. The symptoms which denote this formidable complication are sudden pain in the præcordia, dyspnœa, palpitation, and a sense of oppression, increased by pressure in the intercostal spaces, by inspiration, and by lying on the left side. In other cases however, there is no pain in the region of the heart, but merely dyspnœa and palpitation. The pulse generally increases in frequency and is marked by a peculiar thrill.

For the stethoscopic indications of this affection of the heart, see Diseases of the Heart, Carditis, Pericarditis, &c. As this affection is often obscure, it should be carefully sought for. Its earliest indications are dyspnœa and palpitation, with a peculiarly listless expression of countenance, with or without pain in the region of the heart.

ANATOMICAL CHARACTER.—Inflammation of the *fibrous* tissues of the parts affected, generally terminating in resolution, but sometimes ending in chronic inflammation, and more rarely in deposits of lymph, and consequent permanent stiffening of the joints.

CAUSES.—*Predisposing.* Hereditary predisposition. The male sex; previous attacks; age from 15 to 60. The seasons of spring and autumn.

Exciting.—Exposure to wet and cold.

DIAGNOSIS.—The pathognomonic symptoms of the acute form are inflammatory fever, with pains and inflammation of the larger joints, over which the integuments become distended, smooth, and of a peculiar pale red colour.

From Podagra.—By its less sudden attack; by its generally attacking the larger joints only; by the pain and inflammation shifting their seat; by the more marked and continuous character of the accompanying fever; by the disease not having been preceded by symptoms of dyspepsia; by its occurring at any period of life, whereas gout is usually confined to the adult period. From *Neuralgia*, by the history of the case, and by the fact that, in neuralgia affecting the same parts, the pain is generally confined to a single joint. From *Periostitis*; by the extreme tenderness on pressure of the inflamed portion of bone in that disease; and by its occurrence in the bones of the cranium, on the sternum, or on the shin bone, as well as in the bones forming the large joints; also, by the previous history of the case.

PROGNOSIS.—*Favourable symptoms.* A general, but not unnaturally profuse, perspiration; the repeated or continuous deposit of a lateritious or furfuraceous sediment in the urine; eruptions on the skin; —moderate hæmorrhage of florid blood from the nose or other parts. *Unfavourable.* Metastasis of the inflammation to the heart, chest, or brain; producing the symptoms of the idiopathic diseases of those organs. The disease is very rarely fatal; but often leaves behind it organic disease of the heart by which life is shortened, or chronic inflammation of the joints, with a great susceptibility of future attack.

TREATMENT.—*Indications.* 1. To diminish the local inflammation and febrile action. 2. To relieve urgent symptoms.

I. The first indication is fulfilled by general and topical *bloodletting.*

General bleeding should be had recourse to only at the onset of the disease, in all cases where the vascular action is strong, the heat considerable, the constitution robust, and the patient not advanced in years; and it may be repeated after a short interval if the symptoms continue violent.

The repetition of bloodletting is to be regulated by the effect produced, and not by the buffy appearance of the blood, which in many cases continues to increase, notwithstanding the abstraction of blood. General bleeding may be followed up by topical bloodletting, by leeches, and cupping, when there is considerable pain and tumefaction, about a joint or limb.

The bowels should be kept open by mercurial purgatives at night, followed by saline aperients the following morning. The mercurial purgatives may be advantageously combined with opium :—

℞. Hyd. chlorid. gr. iii.
Ext. coloc. c. gr. iii.
Pulv. opii gr. i. M. f. pilulæ duæ.

The warm bath may be resorted to with advantage at the onset of the attack; and when the disease is beginning to abate, it may be administered two or three times a-week with advantage. Carbonate of soda may be added to the bath in sufficient quantity to render it decidedly alkaline.

Thus far most practitioners are agreed, but much difference of opinion exists with regard to the other remedies.

The treatment which appears to me to have been most effectual is a full bleeding, followed immediately by sulphate of quinine in two-grain doses every three hours. This may be combined with tartar-emetic where there is much inflammation and fever; and opiates may be given at night when the patient is extremely restless. (G.)

II. When the disease is complicated with heart-affection, cupping, followed by blisters to the region of the heart at the outset of the disease, is indicated; and in lieu of the sulphate of quinine, a combination of tartar-emetic, digitalis, and opium (Vin. antim. pot. tart. f ʒss. Tinct. opii, ♏ v vel ♏ x, Tinct. digitalis ♏ x) may be given at intervals of two or three hours. The effect of the digitalis on the circulation must be carefully watched, and the dose may be increased or lessened according to circumstances. The affected joints, at the outset of the disease, when free from perspiration, may be advantageously enveloped in cotton wool; or when the skin perspires profusely, and the surface is very hot, clothes dipped in an alkaline lotion (Potassæ carb. ℥ss, Aquæ Oss.) and covered with oilskin, may be kept constantly applied.

Remedies.—Calomel and opium; tartar-emetic and opium; digitalis in full doses (♏ xx); colchicum, either alone or in combination with opiates; bark or quinine; nitrate of potash, in full and repeated doses; the same remedy in combination with tartar-emetic; lemon-juice, in doses of half an ounce, three or four times a-day. Blisters to the joints successively attacked; or the same local treatment, with alkalis internally.

2. CHRONIC ARTICULAR RHEUMATISM.

Symptoms.—The chronic form of rheumatism may be either a consequence and termination of the acute, or it may be independent of it. In the first case, the parts which were affected with inflammation are left weak, rigid, in some instances œdematous; and the pain, which was before shifting, is now usually confined to particular parts; sometimes, however, it still shifts from joint to joint, but without occasioning acute inflammation or fever. Exposure to wet and cold will often bring on an attack, which continues for a considerable time, and at length goes off, leaving the affected joints weak and stiff.

Chronic articular rheumatism not being a sequel of the acute disease, generally attacks the smaller joints of the hands and feet, in preference to the larger joints, and is then commonly called rheumatic gout.

When the disease is confined to one or two joints, local applications are indicated: leeches on every marked return or increase of inflammation; blisters at a short distance from the affected joint, or even to the joint itself; and friction. Where there is much effusion about the joints, electricity or electro-magnetism may be advantageously employed. Where the disease is more extensive, we must employ general remedies to the exclusion of local ones. The vapour-bath is amongst the most powerful of these remedies. The warm-bath is of less efficacy, but the thermal mineral waters of Vichy, Aix-la-Chapelle, Karlsbad, Wiesbaden, &c., have long enjoyed a high and deserved reputation in the treatment of chronic articular rheumatism. A warm climate also proves beneficial to cases which have arisen in a cold one, though warm climates are peculiarly favourable to the occurrence of rheumatic affections.

Remedies.—Dover's powder, in repeated small doses (gr. v three times a-day); Vinum colchici (♏ xx) in combination with opium (Tinct opii ♏ v); guaiacum, in the form of decoction, or ammoniated tincture; the hydriodate of potash (gr. iii to gr. v) with sarsaparilla. The latter remedy is of great service in articular affections produced by a syphilitic taint.

3. MUSCULAR RHEUMATISM.

Varieties.—Some forms of the disease have obtained distinct names, according to the seat of the affection; as *pleurodyne*, when it attacks the muscles of the side; *lumbago*, when its seat is the loins; *crick in the neck* when it affects the muscles of the neck. Rheumatism of the muscles of the back of the thigh is sometimes, though incorrectly, called *sciatica*.

Symptoms.—Pain, varying in character and severity, from a dull aching to the most acute lancinating pains, affecting the entire body, the trunk, a single limb, or a single muscle or group of muscles; coming on sometimes suddenly, at others after shivering and slight feverishness: often forming the most distressing feature of a common cold, and remaining after the other symptoms have vanished. The muscles are also the seat of the severe pains in the chest and abdomen which accompany spinal irritation.

PROGNOSIS.—Favourable. The disease is unattended with danger. Its duration is variable, extending from a few hours or days to as many months or years, and often defying all treatment. The general health is little, if at all, affected.

DIAGNOSIS.—The pain is increased by motion of the affected part, by percussion with the points of the fingers, and by the sudden removal of pressure; but it is relieved by firm pressure gradually applied. It is augmented in some cases by the warmth of bed, in others, relieved by it. When increased by warmth, it is called *acute;* when relieved by it, *chronic.*

TREATMENT.—The *acute* form of rheumatism, which is increased by the warmth of bed, requires colchicum and opium, with aperients—

℞. Vin. colch. ♏ xx.
Tinct. opii ♏ v.
Magnes. carb. gr. x.
Magnes. sulph. ʒi.
Aquæ ℥iss. M. f. haustus.

To be taken three times a-day.

The warm bath, local depletion, by cupping or leeches, where the affection is local and of great severity, and the application of the belladonna plaster, or friction with an opiate liniment. Veratria-ointment has been recommended, but must be used with caution.

The *chronic* form is best treated by guaiacum in combination with stimulants, in the form of the tinctura guaiaci ammoniata, and by local stimulants, such as frictions with stimulating embrocations, blisters, dry cupping, and acupuncture. The latter remedy has often effected a cure of severe and lingering attacks. It may be very advantageously employed in lumbago. Electricity has also been used with advantage.

Persons subject to rheumatism should wear flannel or cotton next the skin, and should carefully protect the parts most liable to the disease. They should also avoid as much as possible exposure to wet and cold.

PLEURODYNE.

This is a very common affection. It is a complication of almost all the functional diseases of young and middle-aged females, occurring in dyspepsia, amenorrhœa, menorrhagia, leucorrhœa, hyperlactatio, chlorosis, &c., and in almost all diseases of females accompanied by much debility. It almost universally attacks the muscles of the left side. In males, it is equally common on both sides. Acute pain in the muscles of the left side generally precedes by some days the appearance of shingles. Its *causes* are debility, over-exertion, as in the effort of coughing, and distension of the stomach with flatus.

DIAGNOSIS.—The *diagnosis* of pleurodyne is of great importance, though the disease itself is of little or none. It is distinguished from pleuritis, with which it is often confounded, to the great injury of the patient, by the absence of the constitutional symptoms of the acute phlegmasiæ, and of the stethoscopic indications of pleurisy; by being increased by motion of the affected parts, as in raising the arm, or twisting suddenly round, or by a sudden inspiration or expiration, by the effect of sudden and slight percussion with the points of the fingers, and by the sudden increase of the pain on the removal of pressure. Any one of these signs in the absence of severe constitutional symptoms is decisive of the character of the affection. It is distinguished from the neuralgic pain preceding the eruption of shingles by its less severity. Extremely acute pain should lead the practitioner to foretell shingles, as at least a possible event.

COMPLICATIONS.—Pleurodyne may be complicated with chest disease (for it is a common consequence of a cough), and with acute dyspepsia: so that the practitioner should not rest satisfied with ascertaining the real nature of the pain, but should inquire for possible complications. It is also a common accompaniment of the debilitating diseases mentioned above.

TREATMENT.—The treatment of idiopathic pleurodyne is by the application of the emplastrum belladonnæ, or the emplastrum saponis c. opio; in mild cases, of the common emplastrum roborans; in more severe ones, of a blister, with the internal administration of colchicum. Symptomatic pleurodyne must be treated by removing its cause.

Allied to pleurodyne is an acute pain of the muscles of the abdomen or diaphragm, or of both together. That of the abdomen is apt to be confounded with peritonitis, as pleurodyne with pleurisy. The diagnosis is easy. Graduated pressure gives relief, except where sudden expiration throws the muscles into action; but the sudden removal of pressure causes acute pain; percussion with the points of the fingers and sudden motion of the part affected also increase the pain. The absence of severe constitutional symptoms will assist the diagnosis, as will also the kind of respiration. In pleurodyne, the respiration is abdominal; in rheumatism of the muscles of the abdomen, it is carried on by the chest. When the diaphragm is much affected, the respirations are short and catching, and accompanied with acute suffering.

Muscular rheumatism also attacks internal viscera, as the muscular texture of the heart, causing violent palpitation; the muscular coat of the œsophagus, giving rise to much pain in swallowing; and the muscular substance of the impregnated uterus leading to severe pains, similar to labour pains. Many internal muscular pains are connected with flatulence, or symptomatic of dyspepsia.

LUMBAGO.

This disease occupies the mass of muscles in the loins, and, when severe, confines the patient to bed, or obliges him to walk carefully with crutches, or with the assistance of others. The slightest motion causes excruciating agony.

DIAGNOSIS.—From *the pains in the back which accompany the cold stage of febrile disorder*, by the effect of motion, which increases the pain of lumbago, but has no effect on febrile pains. From *disease of the kidneys*, by the unchanged character of the urine, or, if it undergoes a change, by its consisting in the common lithic acid deposits; and by the absence of symptoms of disease of the kidney. Transient and severe attacks of rheumatism in a single muscle or group of muscles sometimes pass off, after lasting a few hours or a day, by a copious red sediment in the urine. From *lumbar abscess*, by the absence of rigors, and of hectic fever, and by the negative results of a careful examination of the part affected. It should be borne in mind that collections of matter in the muscles of the back may *point* at the lower part of the back itself, at any part of the abdominal parietes, or below Poupart's ligament.

TREATMENT.—The general treatment is that of other forms of muscular rheumatism (see *supra*). The local treatment consists in cupping to the loins, or in dry cupping, if the pain is very severe, followed by the emplastrum belladonnæ. In less severe cases, a liniment containing laudanum (Liniment. saponis, or Liniment. camph. f ℥vss. Tinct. opii f ℥ss) may be rubbed into the seat of the pain three or four times in the day; or the Emplast. saponis c. opio, or Emplast. picis C. may be kept applied to the back.

PODAGRA—THE GOUT.

VARIETIES.—1. Regular gout; 2. Misplaced gout; 3. Atonic gout; 4. Retrocedent gout.

SYMPTOMS.—The paroxysm of gout most frequently comes on about two o'clock in the morning, with pain in the ball of the great toe of one foot (more rarely in the heel, ankle, or instep), accompanied by rigor, and followed by feverish heat. The pain increases in violence till it becomes perfectly excruciating, and is accompanied by extreme restlessness. The joint is, at the same time, exquisitely tender, so that the patient cannot bear the weight of the bed-clothes, or the slightest jar or movement in the room. The pain, having attained its acme towards the following evening, ceases sometimes suddenly, sometimes gradually, about midnight; a general moisture breaks out upon the skin, and the patient falls into a sound sleep. On awaking next morning, the parts, before so painful, are found swollen, of a deep red colour, tense and shining, the surrounding parts œdematous, and the vessels turgid. For several days and nights the same round of symptoms occur in a mitigated form, till at length the redness and swelling subside, the skin desquamates, and the joint is either restored to its healthy state, or becomes the seat of the chronic form of the disease.

It rarely happens that one fit of gout is not followed, at a longer or shorter interval (sometimes of months sometimes of years), by a second attack. Most patients indeed have several successive attacks, which occur at first at the same season of the year, but at length take place very frequently, extending first to both feet simultaneously or in succession, then to the hands, and at length to almost all the joints of the body. These subsequent attacks are attended with less pain, but with more constitutional disturbance. At length the joints become stiff, and in many cases they are the seat of chalky deposits.

The fits of gout sometimes appear without any distinct premonitory symptoms, but they are generally preceded by dyspepsia, with its usual attendants, lassitude, torpor, dejection of spirits, and irritability of temper; unusual coldness and numbness of the extremities, alternating with sense of pricking, or formication; frequent cramps; and unusual turgescence of the veins of the leg.

When the gouty diathesis prevails in the system, but, from certain causes, does not produce the usual inflammatory affection of the joints, it often appears in the form of an affection of some internal part. If it be in the *stomach*, there are pain, nausea, vomiting, eructations, dejection of mind, and other symptoms of dyspepsia and hypochondriasis: these are frequently accompanied by cramps in several parts of the trunk and upper extremities; sometimes there is obstinate costiveness, sometimes diarrhœa. If in the *viscera of the thorax*, it produces palpitation, syncope, angina, dyspnœa. asthma. When *the head* is affected, there is cephalalgia and vertigo; and apoplectic and paralytic affections are sometimes the consequence. When it attacks the spinal cord, it becomes the cause of severe neuralgic affections, terminating in paralysis. These gouty affections of internal parts, without any inflammation of the joints, have been termed *misplaced* gout. The term *atonic* gout has also been applied to them, on the supposition that the system had not strength to throw the disease out.

Sometimes the inflammation of the joints having come on in the usual manner, but without reaching the ordinary degree of severity, or, continuing for the customary time, suddenly and entirely ceases, while the disease is transferred to some internal part. This is called *retrocedent* gout.

CAUSES.—*Predisposing and remote.* The male sex; the adult age, more especially the middle period of life (it seldom occurs before the age of puberty, and in a large proportion of cases makes its first attack between 30 and 40); hereditary predisposition; full plethoric habit of body; indulgence in the use of animal food and fermented liquors, especially malt liquors; sedentary and studious life; the free use of acid and acescent wines; dyspepsia. Gout is not peculiar to the rich, but often affects poor persons of temperate habits after a period of privation.

Exciting.—The application of cold to the extremities; fatigue; anxiety of mind; excessive evacuations; sprains and blows; intemperance of whatever kind; the ceasing of usual labour; the sudden change from a very full to a very spare diet; the suppression of customary evacuations, as of the piles, which is a common accompaniment of the gouty diathesis.

DIAGNOSIS.—From *rheumatism;* by the previous dyspeptic symptoms; by the pains in the one disease attacking the smaller joints, especially the great toe, in the other the larger joints. By the more intense colour of the inflamed part. By the frequent remissions of pain. By the presence of itching and desquamation. By the absence of the profuse acid perspiration of acute rheumatism. Sometimes by the age at which it occurs; acute rheumatism being not uncommon in childhood, while gout is very rare before puberty. Sometimes also by its hereditary transmission; acute rheumatism being rarely an hereditary disease. The heart affections so common in acute rheumatism are comparatively rare in gout.

PROGNOSIS.—*Favourable.* Youth, and an unimpaired constitution; the more severe the paroxysm, the shorter its duration; the longer the intermission, the more effectual is the paroxysm in removing various anomalous diseases, to which the patient had been before subject; its not being hereditary.

Unfavourable.—Impaired constitution, especially in persons of advanced age; concomitant visceral affections; hereditary predisposition to the disease; the deposition of chalky matter on the joints; the disease suddenly receding from the extremities, and attacking an important internal organ, as the stomach, heart, brain, lungs, &c.

TREATMENT.—*Indications.* I. To shorten the paroxysm, and relieve the sufferings of the patient. II. To prevent the recurrence of the paroxysm.

I. An attack of gout may be effectually shortened by the use of the preparations of colchicum, administered in one of two ways: in a full dose of from ʒss to ʒi of the *Vinum Colchici* at bed-time, followed by a saline aperient in the morning; or, in the smaller dose of from ♏x to ♏xx three or four times a-day. In either case the colchicum may be given in combination with laudanum. When administered in a single dose, the following formula will be found convenient. ℞. Vin. Colchici fʒi; Tinct. Opii ♏xx; Aquæ Cinnamoni, Aquæ āā, ℥ss. m. f. Haustus. h. s. s. When given in smaller doses, and repeated, the colchicum and opium should be combined with a saline aperient. A convenient formula consists of a drachm of sulphate of magnesia, ten grains of the carbonate, twenty minims of the vinum colchici, and five drops of laudanum.

The dose of colchicum may be diminished as the inflammation abates, and the same remedy may be advantageously given in small doses of from five to ten minims, in combination with a gentle saline aperient, for several days, or one or two weeks, after the disappearance of the malady.

The *local* treatment consists in keeping the inflamed part moderately warm with flannel, wool, or fleecy hosiery, keeping the limb as quiet and still as possible, and carefully abstaining from everything that might add to the irritation.

II. The second indication is fulfilled by regularity of life, avoiding the exciting causes of the disease; abstinence from the use of animal food and fermented liquors; milk and vegetable diet; friction with the flesh-brush; regular exercise; tonic and stomachic bitters and chalybeates, such as are recommended for the cure of dyspepsia; Bath waters; the regular use of mild aperients; the long-continued use of alkaline medicines.

Treatment of the retrocedent Gout.—If the stomach be the seat of the disease, the liberal administration of stimulants, such as warm brandy and water, or wine and aromatics; or æther, ammonia, assafœtida, camphor, and musk. Sinapisms should be applied to the feet, in all cases of retrocedent gout, with a view of restoring the external inflammation: other forms of retrocedent gout must be treated by the remedies appropriate to the cure of the idiopathic affections of the same organs.

GOUTY CONCRETIONS.—Gouty concretions, or chalk stones, as they are called, consist of urate of soda, and are deposited in the cavities of joints, in the bursæ mucosæ, in the ligaments, aponeuroses, and cellular membrane, and even under the cuticle. They do not admit of removal by absorption, but the pain which they occasion may be relieved by warm poultices, which will also promote their separation by suppuration.

REMEDIES.—*General.* The Eau Medicinale, and Wilson's Tincture, which contain colchicum or veratria as their active principle. *Local.* The pediluvium of simple water; a tepid bath of water and muriatic acid, in the proportion of one ounce to a gallon of water; camphorated spirit largely diluted with water; leeches; blisters; stinging with nettles; burning with moxa; covering the part with oilskin. But the less the part is interfered with the better, for the use of extreme remedies often leads to the translation of the inflammation to an internal organ. Exciting a perspiration on the part by fleecy hosiery or flannel is sometimes attended with the most beneficial effects. A narcotic cataplasm or anodyne fomentation also affords great relief. Cold water, ice, or cold evaporating lotions have been recommended; but cannot be used without danger. For the gouty concretions Dr. Alexander Ure (see Med. Chir. Trans., vol. xxiv.) recommends the exhibition of Benzoic acid in doses of a scruple about an hour after each meal. This substance is advantageously combined with some salt of soda, and the best for the purpose is the bicarbonate, which may be given in doses of one, two, or three drachms. This remedy must be persevered in for a considerable period where extensive deposits have already taken place.

SPECIAL DISEASES.

CHAPTER I.

DISEASES OF THE NERVOUS SYSTEM.

1. Of the Brain.
2. Of the Spinal Marrow.
3. Of the Nerves of Sensation.
4. Of the Nerves of Motion.
5. General Disorders of the Nervous System.
6. Mental Disorders.

DISEASES OF THE BRAIN.

Cephalalgia	Headache.
Phrenitis	Inflammation of the Brain.
Meningitis	Inflammation of the Membranes.
Hydrocephalus	Water in the Head.
Apoplexia	Apoplexy.
Chronic diseases of the Brain.	

CEPHALALGIA—HEADACHE.

Synonym.—Cephalæa.

Headache is a symptom of almost all acute and chronic diseases of the brain, as well as a distinct functional derangement of very frequent occurrence.

Species.—(*a*) External, (*b*) Internal.

(*a*) External. 1. Cephalalgia muscularis; 2. Cephalalgia periosteosa; 3. Cephalalgia neuralgica.

(*b*) Internal. 1. Cephalalgia congestiva; 2. Cephalalgia dyspeptica, vel sympathetica. 3. Cephalalgia organica.

External.—1. *Cephalalgia muscularis*, or pain of the muscular covering of the head, affects the occipito-frontalis and temporal muscles. *Diagnosis.*—The pain is diffused over the head, remitting in character, increased by motion of the eyebrows and jaws, by pressure, and by percussion with the fingers. It is generally accompanied by pain in the face, neck, shoulders, or other parts of the body. *Cause.*—Exposure to cold. *Treatment.*—That of muscular rheumatism. In very severe cases, leeches or a blister to the back of the neck.

2. *Cephalalgia periosteosa.*—Seat, the pericranium.—*Diagnosis.* Pain, sometimes extending over the entire head, but more frequently limited to one spot, increased by firm and deep pressure, but less affected than the preceding form by motion of the surrounding muscles. It sometimes affects the periosteum of the face at the same time, so that the nose is tender to the touch; and it frequently extends to other parts of the body, especially to the shin and sternum. When limited to one spot, it is commonly attended with swelling. *Causes.*—Over-excitement of the brain, from anxiety of mind or intense application, combined probably with the effect of cold. In such cases the pain is generally diffuse. When the pain is limited to one spot or to a few points only, it is often traceable to a syphilitic taint, will be found to coexist with similar affections of other bones, and, in many instances, to have been preceded by ulcerated sore throat, or by syphilitic diseases of the skin. The patient's health also suffers more or less, and he has the outward appearance and expression of countenance familiarly known as *Cachexia syphilitica.*—(See Cachexia p. 230.) *Treatment.*—When the pain affects the entire scalp, the treatment is that appropriate to a common cold, of which it is an occasional accompaniment. Ten grains of Dover's powder should be given at night, and a saline aperient in the morning. More active treatment will rarely be required. If the disease is traceable to a syphilitic taint, the iodide of potassium in five-grain doses, in combination with infusion of quassia, or other tonic infusion, or with the simple or compound decoction of sarsaparilla, should be given three or four times a-day. If the bone beneath is affected, and matter is formed, free incisions will be necessary, followed by the treatment prescribed in surgical works for the diseases of bone.

3. *Cephalalgia neuralgica vel periodica.*—Seat, the nerves of the integuments of the internal angle of the orbit and side of the nose (*megrim*), or of one side of the head and face (*hemicrania*). *Diagnosis.*—Its periodic character, which resembles that of an ague, and occurs with the same regularity at variable intervals of one day or more, or even of weeks or months. In this it differs from the two former species, and from common tic doloreux. The absence of tenderness on pressure, and of increase of pain on contraction of the muscles of the scalp, further distinguish this from the first and second forms. In many cases the disease is not distinctly intermittent, but is characterized by irregular intervals of perfect ease, and by being bounded by the central line of the head and face. *Cause.*—Exposure to cold and wet—marsh miasma. *Treatment.*—The same as for ague, viz., quinine (in doses of two grains three times a-day), or liq. pot.

arsenitis (in doses of five drops, combined with some tonic infusion, three times a-day). The latter remedy, when cautiously administered, is to be preferred. The treatment is the same, whether the disease is distinctly intermittent or merely limited in the manner just stated. The general health must at the same time be attended to.

INTERNAL.—1. *Cephalalgia congestiva*, or *congestive headache*. This presents itself in three different states of constitution—the plethoric, the delicate and irritable, and the weak and leucophlegmatic. *Diagnosis.*—Obtuse pain, affecting the whole of the head, especially the forehead and occiput, combined in the *plethoric* with a bloated countenance, a full red eye, distension of the veins, a full pulse, and a dull and heavy expression of face: in the *delicate and irritable*, with flashes of light, floating specks before the eyes, noises in the ears, cold extremities, and small, frequent, quick pulse: in the subjects of *anæmia*, with pale skin, lips, tongue, and gums, cold extremities, palpitation of the heart, violent throbbing of the carotid arteries, and small, frequent, quick pulse. In the two latter cases it is brought on in violent paroxysms, by sudden noises, mental emotions, or any violent muscular exertion. *Treatment.*—In the *plethoric*, depletion by bleeding, general and local, cautious regulation of the diet, and aperients frequently administered. In cases of ordinary severity, it will suffice to keep the bowels a little more free than usual by saline aperients given two or three times a-day. (℞. Ant. pot. tart. gr. ⅛; Magnes. sulph. ʒi; Magnes. carb. gr. x; Aquæ menthæ pip., Aquæ, āā f ℥ss). In the *delicate and irritable*, by repose of mind, careful attention to the state of the stomach and bowels, and by small doses of narcotic or sedative medicines. A pill, combining a sedative with an alterative, may be given every night, or every other night; and a saline aperient, combined with some tonic infusion, every morning, or every other morning. (℞. Pil. hyd. chloridi c. gr. i; Pil. rhei. c., Ext. conii, āā gr. ii. f. pilula. ℞. Sodæ sulphatis ℥ss; Sodæ carb. gr. x; Tinct. zingib. f ʒii; Infus. cascarillæ f ℥x.) In the subjects of *anæmia* (see Simple Chronic Anæmia, p. 227), by steel in full doses; or, where there is great debility, stimulants. Where there is *anæmia*, there steel may always be safely given; when much blood has been lost, stimulants, with full doses of opium, may be given with equal safety.

2. *Cephalalgia dyspeptica vel sympathetica.*—*Diagnosis.* Pain usually fixed, and seated in the left temple, or over the right eye, or on the top of the forehead. It commonly commences when the patient first rises in the morning, and in slight cases continues till after breakfast; in more severe ones, it begins as a diffuse heavy pain, and gradually becomes fixed in one spot, accompanied with nausea, sickness, and vomiting. There is also confusion of thought, dimness and indistinctness of vision, and singing in the ears. Sometimes the fit is removed by free evacuation of ingesta, or of frothy mucus or bile from the stomach. Its duration varies from some hours to three or four days, and in confirmed cases it returns at short intervals, and is

attended with most severe suffering. Sometimes there is much flatulence present, and relief is only afforded by free eructation. *Cause.*—Derangement of the functions of the stomach and bowels. The bad habit of taking physic day by day, by which the tone of the entire alimentary canal is weakened. *Treatment.*—Gentle aperients in combination with alkalies, as rhubarb with soda, or magnesia, or the dinner pill. Regulation of the diet; proper exercise; emetics, where the cause is transient. In cases of obstinate sick headache, emetics of ipecacuanha may be administered every morning with the best effect. If the pernicious habit of taking physic have been formed, it should be broken through, for though strong aperients often give relief for the time, they always aggravate the disorder. If large quantities of bile are ejected from the stomach (bilious headache), small doses of calomel, or hyd. c. cretâ (a quarter of a grain of the first, or a grain of the second, administered three times a-day, with two or three grains of extract of poppy), will be found useful. When the bowels are very irritable, and act irregularly, the best purgative is a combination of the compound rhubarb pill with extract of conium. When much flatulence is present, ginger or alum may be combined with the other medicines, or strong mint-water may be made the vehicle of saline aperients. Cold to the head sometimes acts as a palliative.

3. *Cephalalgia organica.*—*Diagnosis.* Difficult when the pain is unattended by any morbid affection of the senses or moving powers. The pain is generally more fixed and deeper seated than in other forms of headache, more affected by motion and change of posture, by heated rooms, noise, and mental application. If accompanied with disordered digestion or with sickness, it is not relieved by vomiting. Sometimes it is intermittent, and in such cases the diagnosis is more difficult still. The nature of the disease is at length made known by some affection of the senses, by paralysis, spasms, or convulsions. *Treatment.*—That of the disease of which it is the symptom. The state of the circulation through the brain must be carefully watched, and local and general bloodletting, purgatives, and counter-irritants, must be employed, according to the existing symptoms; at the same time that strict attention is paid to the state of the general health. In obscure chronic affections of the brain, in which other remedies have failed, a course of mercury, carried to the extent of affecting the mouth, may, perhaps, suspend some chronic inflammation which is the cause of the existing symptoms.

Great caution is necessary in inquiring into the cause of headache, and in discriminating one form from another. On the closeness of this attention and the accuracy of the diagnosis, the treatment will entirely depend. Sometimes, for instance, a patient will complain of nothing but headache, but on careful inquiry his real disease will be found to be tubercular phthisis.—(G.)

Besides the causes of headache above enumerated, there are others too numerous to specify. An inflammatory headache and a metastatic headache might be added to the foregoing divisions, and many cases might be pointed out which do not come precisely under any of the above heads. Those forms of headache produced by the action of the narcotic and narcotico-acrid poisons, and the headaches which occur in some disorders of the respiration and in the early stage of phthisis pulmonalis, belong to the class of congestive headache.

PHRENITIS—INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

Synonyms—Encephalitis. Meningo-encephalitis.

Species.—1. General, or involving the whole, or a considerable portion, of the substance and membranes of the brain. 2. Partial, or affecting only a part of the substance, or of the substance and membranes, of the brain.

1. GENERAL INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

Symptoms.—Inflammation of the brain and its membranes sets in in different ways in different cases. In one class of cases it begins with acute pain in the head and violent delirium; in a second with nausea, bilious vomiting, and obstinate constipation; in a third with a paroxysm of general convulsions; in a fourth, and very rare class of cases, with loss of speech.

Phrenitis, when fully formed, is characterized by excruciating pain in the head, increased by assuming the erect posture; throbbing of the temporal and carotid arteries; flushed face; injected and brilliant eyes; contracted pupil; and a peculiarly wild expression of countenance. There is intolerance of light and sound, constant watchfulness, want of sleep, fierce delirium, and convulsions. The skin is hot and dry, the pulse hard and frequent, sometimes full, sometimes contracted; the tongue red and dry, or covered with a white fur; there is intense thirst, with nausea and bilious vomiting; and the bowels are obstinately confined. These symptoms, which belong to the stage of *excitement*, continue for a variable period of from one to two or three days, and, gradually subsiding, are succeeded by *collapse*, characterized by stupor, low muttering delirium, indistinctness of vision, insensibility of pupil, strabismus, twitchings of the muscles, tremors, or partial paralysis, relaxation of the sphincters, occasional retention of urine, cold sweats, and the facies Hippocratica. The patient at length falls into a state of profound coma, the prelude of death.

Terminations.—When fatal, in stupor and insensibility; or if protracted, in great prostration of strength, with typhoid symptoms. Recovery may be complete, or the disease may leave behind it mania, dementia, or paralysis. The duration varies from twelve or twenty-four hours to two or three weeks, or even more.

Causes.—Exposure to excessive heats, or to vicissitudes of temperature; subjecting the head uncovered to the rays of a vertical sun, (*coup de soleil*); violent exercise; excited passions of the mind; intense study; the presence of irritating matter in the stomach; external violence; the abuse of spirituous liquors; metastasis of gout, rheumatism, erysipelas, exanthematous fevers, small-pox, measles, and scarlatina; the repression of cutaneous affections, especially those of the scalp; hooping-cough; dentition; the extension of inflammation from the ear. Phrenitis may also occur as a sequela of pneumonia, phthisis, renal affections, and all the febrile diseases.

Diagnosis.—From *mania*, by the presence of marked febrile symptoms, and by its rapid course. From *febrile delirium*, by the delirium being a primary and not a secondary affection. From *the delirium of typhus*, by the mode of accession: the affection of the head in phrenitis comes on suddenly, or after a short continuance of premonitory symptoms, and is extremely violent; the delirium of typhus is preceded by the characteristic marks of that disease, and is usually of the low muttering form. From *the effects of loss of blood*, by the history of the case, the inflammatory symptoms, and the flushed face. From *delirium tremens*, also, by the history of the case, and by the absence of the tremulous motions of the body and limbs, and the presence of fever. In a large class of cases of delirium tremens the face is pale, the limbs tremble, and the patient can be easily roused so as to answer questions.

Anatomical Characters.—Thickening of the arachnoid, effusion of serum mixed with flakes of lymph, or of coagulable lymph, or of pus, under the arachnoid and into the meshes of the pia mater; similar effusions into the ventricles with softening of their parietes; the incised surfaces of the brain present numerous red points, the medullary substance is of a light pink hue, and the cineritious substance of an ashy red, not removed by washing; softening of the substance of the brain; abscess of the brain.

Prognosis.—*Favourable.* The appearance of a warm and equable perspiration; diarrhœa; a sediment in the urine; hæmorrhage from the nose; the pulse diminishing in frequency, and becoming more full and soft; the return of sleep and consciousness; inflammation attacking a less important part. If preparations of mercury have been given, the occurrence of salivation.

Unfavourable.—Profound insensibility, tremors, convulsions; involuntary evacuations; suppression of urine; the face from being flushed suddenly becoming pale; paralysis; inflammation of other viscera, without diminishing the symptoms of the original disease; delirium changing to coma.

TREATMENT.—I. *During the period of excitement. Indication.* To diminish the quantity of circulating fluid, and the force of the circulation, in the system in general, and in the head in particular—

(*a*) By bleeding.—A copious and *sudden evacuation* of blood from a free orifice in the arm, to be repeated, if necessary, proportioning the quantity to the age, sex, temperament, and habit of the patient. This may be followed up, if necessary, by topical depletion, by cupping or leeches to the temples, or by opening the temporal artery.

(*b*) By active purging with castor or croton oil, or with a full dose of calomel and jalap, given at the outset, followed by five-grain doses of calomel every two, three, or four hours.

(*c*) By depressants, in doses short of inducing vomiting. Of these the tartar-emetic is the best. It may be given in doses of a sixth to a fourth of a grain, cautiously increased, and at frequent intervals, and may be usefully combined with the calomel.

(*d*) By counter-irritants to the extremities, such as the mustard-poultice or a large blister to the inside of the thighs, or hot water to the feet frequently renewed.

(*e*) By strict antiphlogistic diet; no food whatever should be allowed during the inflammatory period, except barley-water, gruel, sago, panada, arrow-root, or the like.

(*f*) By local applications, as cold lotions constantly renewed, or ice to the head; or (and this is to be preferred to all other means of applying cold) a stream of cold water poured upon the shaved head.

(*g*) By complete rest and perfect quiet. The most perfect tranquillity should be observed in the patient's room, all loud sounds and light being carefully excluded. The head should be raised by pillows.

II. *During the period of torpor or collapse.*—If the patient has not been already bled, or if the pulse remains hard and frequent, general or local abstraction of blood is indicated, proportioned in quantity to the remaining strength of the patient. Purgatives may also be given with the same precaution. Counter-irritation by mustard poultices or blisters to the inside of the thighs, may be used in combination with the other measures, or, when the strength of the patient is greatly exhausted, alone.

When the symptoms of excitement have passed away, and insensibility or general torpor remains, a blister to the scalp will often be attended with great benefit. In extreme collapse, ammonia, wine, and brandy must be given, with beef-tea and nourishing food, and opium or laudanum may be cautiously administered, its effect being narrowly watched. The state of the bladder must be carefully inquired into at every visit, and if retention of urine exist the water must be frequently drawn off.

III. *During the period of convalescence.*—The patient must be narrowly watched, the diet must be carefully regulated, the bowels must be kept free by gentle aperients, and the patient should not be allowed to resume his ordinary occupations till his health is quite re-established. On the occasion of any slight relapse, cold applications to the head, counter-irritants, and more active purgatives may be resumed. If the mind does not recover its tone, but the memory is impaired, and the patient remains weak and irritable, the cold douche or the shower-bath every morning, with or without blisters to the scalp, or a seton in the neck or arm, may be employed with great advantage.

The disease may be symptomatic of intestinal irritation in children, or of remote visceral disease in adults: and here the foregoing measures must be employed, at the same time that the local irritation or disease is attacked. When it is caused by wounds or injuries to the head, or when it follows congestion caused by narcotics, the treatment must be conducted on the same principles as in the idiopathic form.

2. PARTIAL INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

SYMPTOMS.—The symptoms of inflammation of a part only of the substance of the brain, with or without inflammation of the membranes covering that part, are often very obscure; and they vary with the extent, degree, and progress of the inflammation, as well as with the part of the organ which is the seat of the disease.

In most cases the first symptom of partial inflammation of the substance and membranes of the brain is a pain in the head, more or less severe, rarely altogether absent, but subject to excerbations, under the influence of causes affecting the circulation. This symptom is accompanied from the first, or followed after a time, by giddiness, singing in the ears, indistinct or disordered vision, numbness or increased sensibility of the fingers, of the hands and arms, or of other parts of the surface of the body; and slight convulsive movements of the limbs, with occasional attacks of nausea and faintness. The patient is restless and irritable, or suffers from extreme depression of spirits; the sleep is disturbed, and the mind generally more or less impaired. The state of the circulation is very variable, the pulse being at one time slow and regular, and the countenance pale; at another time, the pulse being frequent and the face flushed; these two opposite states often alternating with each other at short intervals. In some cases the symptoms are distinctly remittent, or even intermittent. The functions of the stomach are generally impaired. The patient suffers from nausea and anorexia, and is liable to frequent attacks of vomiting. As the disease advances these symptoms become more strongly marked, and rigid contractions of particular muscles or groups of muscles are superadded to them, occasioning squinting, distortion of the features, difficult and in distinct pronunciation of particular letters or words, and sometimes great difficulty in swallowing. When the muscles of the extremities are the seat of this rigid contraction, the limbs assume a flexed position, from which any attempt to move them occasions great pain. The pupils of the eye are generally less sensible than usual to light, dilated, or of unequal sizes, and the sight of one or both eyes is found to be impaired. In a still more advanced stage of the disease, the partial contractions of the limbs are exchanged for very extensive and constantly increasing loss of power and sensation, all the senses fail, the sphincters are relaxed, and the patient sinks utterly helpless and exhausted.

The duration of this disease is extremely variable. It may assume from the first an acute character, and terminate fatally in a few days, or it may run a very chronic course of several weeks, months, or years, or the chronic form may, at any time, be exchanged for an acute attack, with extensive inflammation of the membranes of the brain.

ANATOMICAL CHARACTERS.—Congestion of the affected portion of the cerebral substance; hardening of the texture; white or red softening; small extravasated spots of blood; abscess or infiltration of pus; encysted abscess; fatty degeneration of the vessels; gangrene; inflammatory appearances in the membrane covering the inflamed substance. The presence of particles of fibrin or of earthy matter detached from the valves of the heart in one of the vessels.

CAUSES.—Those of phrenitis.

DIAGNOSIS.—From phrenitis, by the slower progress and less marked character of the symptoms. Headache followed by rigidity of some part of the body, and that by paralysis, affords a strong probability of congestion or inflammation of a portion of the substance of the brain, going on to softening. If the affection of the face and extremities is confined to one side of the body, the opposite side of the brain may be presumed to be the seat of the affection; if it extends to both sides of the body, the disease may be supposed to be on both sides, or near to the central line on one side. If the patient suffers from constant pain in the back of the head, and from troublesome erections, and the purely intellectual faculties are little implicated, there is a probability in favour of the cerebellum being the seat of the disease.

PROGNOSIS.—Unfavourable in every stage of the disease, but especially when rigid contractions or paralysis have set in. Somewhat more favourable when the disease is the direct consequence of a wound or external injury.

TREATMENT.—That of phrenitis; but less active. Depletion when indicated should be practised with great caution, and rather by cupping and leeches to the temples or back of the neck, than by the lancet. Counter-irritants may also be prescribed with advantage, of which the best is a seton or issue in the inside of the arm. The rest of the treatment will consist in the daily use of gentle saline aperients, a spare diet, and rest of mind and body.

In the early stage of the disease, mercury may be given so as slightly to affect the gums, with some prospect of advantage.

This is one of the diseases in which it is important that the patient should be constantly watched, the symptoms being combated as they arise, with due regard to the husbanding of the patient's strength. Too active an interference on the part of the medical man is to be deprecated.

MENINGITIS—INFLAMMATION OF THE MEMBRANES OF THE BRAIN.

SYNONYM.—Arachnitis.

Under this head are comprised inflammation of the arachnoid and pia mater, usually designated *meningitis*; inflammation of the arachnoid alone, called *arachnitis*; and inflammation of the dura mater. Cases of pure arachnitis are of such extremely rare occurrence, and their symptoms differ so little, if at all, from those of mixed inflammation of the arachnoid and pia mater, that a separate description of the symptoms of arachnitis is alike difficult and unnecessary. Meningitis, or inflammation of the arachnoid and pia mater, and inflammation of the dura mater, are the only diseases which it is proposed to describe under the general title of meningitis.

INFLAMMATION OF THE ARACHNOID AND PIA MATER.

SYMPTOMS.—This disease commences differently in different cases. Sometimes it begins with sudden and violent pain in the head, with loud screaming, which is followed by convulsions. In other instances it also commences suddenly with a long-continued paroxysm of general convulsions. In a third class of cases its attack is less sudden, the convulsions being preceded for two or three days by a general feeling of discomfort, slight headache, nausea, and vomiting. The convulsions are soon followed by coma, which ends fatally after a variable period of from one to five or six days. The pulse is sometimes natural in frequency, sometimes less frequent than in health, and in other cases, again, it is described as small and frequent. Strabismus is occasionally present, and in some cases the patient is delirious. In these latter instances the disease is probably complicated with inflammation of the substance of the brain.

For the treatment, see Phrenitis.

INFLAMMATION OF THE DURA MATER.

SYMPTOMS.—Pain in the head, fever, and rigors, which often recur at regular intervals, and simulate ague. The intellectual faculties are, at first, but little affected, but during the progress of the disease the patient often falls into a state of coma. If the inflammation extends to the other membranes, or to the substance of the brain, the symptoms proper to inflammation of those parts show themselves. The disease is very rarely idiopathic, but follows on injuries to the scalp or bones of the head, or on inflammation of the internal ear.

For the treatment, see Phrenitis.

HYDROCEPHALUS—WATER IN THE HEAD.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE HYDROCEPHALUS.

SYMPTOMS.—This disease, like inflammation of the brain and its membranes in the adult, begins differently in different cases. Sometimes it is preceded, for a considerable period, by languor, inactivity, loss of appetite, nausea, vomiting, parched tongue, hot dry skin, flushing of the face, and other symptoms of pyrexia, or by the symptoms of infantile fever. (See Infantile Fever, p. 296.) In a second class of cases, it begins suddenly with the symptoms of inflammation of the brain and its membranes in the adult. (See Phrenitis, p. 331.) In a third class of cases, again, it comes on, slowly and obscurely, in the course of febrile disorders or of the exanthemata.

The disease itself is characterized by acute darting pains in the head, occurring at intervals; pain over the eyes; great sensibility to light; suffused redness of the eyes; flushed countenance; contracted pupils; extreme restlessness; short disturbed sleep, from which the patient often starts screaming. The gait is tottering, and the hand is often raised to the head. The pulse is small, quick, and frequent; the respiration is hurried, and the patient sighs frequently. The tongue is coated; there is nausea or vomiting; the bowels are either obstinately confined, or unusually loose, with fœtid evacuations. Delirium and convulsions are sometimes combined with these symptoms of the stage of *excitement*. In infants there is strong pulsation of the fontanelles.

After a variable, and often a considerable, period, the violence of the symptoms begins to subside, the pain becomes less acute, the patient keeps up a low moaning; an uneasy sleepiness succeeds a constant state of watching; the pupils are dilated, and strabismus is often present; the pulse is now preternaturally slow and often intermitting, and the respiration is more frequently interrupted by deep sighs. The strabismus increases; the pupils become more dilated and cease to contract on being exposed to light; and double vision or complete loss of sight, with lethargic torpor, succeed.

After a shorter or longer continuance of the second stage, the pulse again returns to a febrile state, and becomes so extremely small and rapid as scarcely to be numbered; there is extreme difficulty of breathing; stertor supervenes; the evacuations become involuntary; maculæ sometimes appear about the joints, and in different parts of the body; and at length the patient expires in dreadful convulsions, comatose, or exhausted.

TERMINATIONS.—In slow recovery; in death; or in chronic hydrocephalus.

ANATOMICAL CHARACTERS.—Serum, limpid or turbid, to the amount of several ounces, in the ventricles of the brain; softening of the surrounding cerebral substance; flattening of the convolutions; serous effusion beneath the membranes of the brain; the cortical texture of the brain of a pink hue, the medullary matter, when sliced, exhibiting great numbers of red points. The pia mater unusually vascular; the arachnoid presenting an opaque appearance; minute semi-transparent or opaque bodies, single or in patches, in the substance of the pia mater; sometimes larger masses of tuberculous matter from the size of a millet seed to that of a pea, constituting *tuberculous meningitis.*

CAUSES.—*Predisposing.* Childhood; general debility; scrofulous diathesis.

Exciting.—Intestinal irritation; dentition; metastasis of eruptions on the scalp or body; febrile and exanthematous disorders.

Proximate.—In one considerable class of cases, tuberculous deposits in the pia mater, giving rise to inflammation of the membranes.

DIAGNOSIS.—The most prominent symptoms are, the excruciating pain in the head, flushed face, restlessness, and fever; followed by strabismus, dilated pupil, and profound stupor; the pulse at first preternaturally quick, afterwards becoming inordinately slow or intermitting, and then, again, increasing in frequency. To this rule, however, there are marked exceptions. It is necessary to distinguish this disease from one of an opposite character, called *spurious hydrocephalus*, which has the following characters: *a pale cheek, a cool or cold skin*, an expression of great languor, and *an absence of febrile symptoms*, or, at the most, an occasional and transient flushing of the face. On inquiry, the child will be found to have suffered from loss of blood, or from long-continued diarrhœa.

PROGNOSIS.—Very unfavourable, more especially where the coma is great, with total loss of sight, weak intermitting pulse, great enlargement of the head, apoplectic stertor, difficult respiration, and involuntary evacuations.

TREATMENT.—*Indications.* I. To subdue inflammation.
II. To remove existing sources of irritation.

I. The inflammation is subdued by—

(*a*) Abstraction of blood by the application of leeches to the temples or back of the ears, or by opening the temporal artery. In very young children, leeches to the temples or behind the ear will answer every purpose of venæsection or arteriotomy.

(*b*) Cathartics; of jalap, and submuriate of mercury.

Half a drop, or a drop, of croton oil is a sure purge, which may be disguised and given to children when other medicines are refused.

(*c*) Antimonial preparations. These may be given in combination with preparations of mercury. Calomel, in doses of two or three grains, every two or three hours, either alone or in combination with tartar-emetic, in doses of one-eighth to one-sixth of a grain or more, is perhaps the best remedy. Children bear purgatives, and especially mercurial purgatives, well.

(*d*) Cold applications to the head; by cloths wetted with cold water, or vinegar and water, which may be made very cold by ice, or solutions of muriate of ammonia and nitrate of potass. Cold water dropped on the head, the head being slightly raised, and the effect of the cold to the head being increased by immersing the lower extremities, or the body of the patient, in warm water.

(*e*) Counter-irritants, in the shape of mustard poultices or blisters to the thighs, chest, or back of the neck.

II. The second indication is fulfilled by the use of aperients and alteratives to free the alimentary canal and correct the secretions, and by the free use of the gum lancet, if the teeth are the source of irritation.

2. CHRONIC HYDROCEPHALUS.

SYMPTOMS.—Children are sometimes born with this disease. In other cases it comes on slowly and insidiously; or it follows the acute form of the disease. It takes place at all periods between birth and the age of eight, very seldom after, and is known by drowsiness, languor, strabismus, vomiting, costiveness, coma, and convulsions; the bones of the head separate, the fontanelles enlarge, and the head acquires an immense size.

CAUSES.—*Predisposing*. Infancy; the scrofulous diathesis.

Exciting.—Injury to the brain during labour; tumours within the cranium; the causes of other dropsies; dentition; irritation in the intestinal canal. It is also a consequence of the acute form.

DIAGNOSIS.—The history of the case, the large size of the head, and the prominence of the fontanelles.

PROGNOSIS.—The disease generally ends fatally; though, after the bones begin to separate, its fatal termination is protracted. Death is commonly preceded by convulsions.

Parents often express anxiety about the large size of their children's heads, and they are sometimes told that the enlargement is due to water in the head. As this question is often put to the medical man it is well that he should be cautioned not to attribute a large head to this cause, unless the increased size is accompanied by other decided symptoms of the disease.

TREATMENT.—*Indications.* I. To promote the absorption of the effused fluid. II. To improve the general health.

I. The first indication is fulfilled by,—

(*a*) Counter-irritants; blisters to the head, kept open for days or weeks by the unguentum lyttæ or the unguentum sabinæ; or a plaster of wax and tartar-emetic; or frictions with tartar-emetic ointment; or an issue over the fontanelles.

(*b*) Mercury; applied externally, and given internally, so as to affect the mouth.

(*c*) Diuretics of squills, digitalis, and submuriate of mercury, as recommended for anasarca.

II. The second indication is fulfilled,

(*a*) By a careful regulation of the diet according to the age of the child.

(*b*) By tonics, such as quinine, and the preparations of iron.

(*c*) By a change of air, especially if the patient inhabits a low and damp situation, to the sea-side, or a dry and bracing inland spot.

When depletion, leeching, warm baths, sinapisms, blisters, and purgatives have failed, and the pupils are dilated, the respiration stertorous, the limbs convulsed or paralyzed, together with coma, and an extremely frequent or slow pulse, effusion has probably taken place, and we must endeavour to arrest or diminish it by promoting absorption, and by causing powerful revulsion. This is effected by blisters, antimonial ointment rubbed into the neck and behind the ears, and mercurial frictions at the angles of the jaws and over the scalp. We should also exhibit calomel freely, in doses of three or four grains every three hours, so as to act freely on the bowels, and to affect the system, if possible. It is extremely difficult, however, to produce salivation in hydrocephalus. So much as 500 grains have been administered without causing ptyalism. The calomel may be combined with James's powder, or with tartar-emetic.

Nauseating doses of tartarized antimony, given every hour, have been strongly recommended. The dose may be from a twelfth to an eighth of a grain, cautiously increased, according to the age. Vomiting should be carefully avoided in inflammation of the brain or its membranes. It often happens that the disease lingers for a long time, and that the digestive functions are unaffected. In such cases a mild, nutritious diet, composed of sago, arrow-root, tapioca, and light puddings may be allowed; and if there be much prostration of strength a teaspoonful of some of the white wines, Sherry, or Madeira, may be given at short intervals throughout the day. The disease now assumes a chronic form, and may continue for months or years, unless tapping be resorted to, which may affect a cure.

Successive tappings of the brain for the removal of the fluid, followed by compression, have been practised with complete success, and compression alone has proved successful in one or two cases.

APOPLEXIA—APOPLEXY.

Species.—1. Simple or congestive apoplexy; *i. e.*, congestion of the vessels of the brain without rupture; 2. Hæmorrhagic apoplexy, or congestion with rupture; and 3. Serous apoplexy, or congestion with serous effusion.

SYMPTOMS.—This disease makes its attack in one of three ways:—suddenly, the patient falling down without warning, as if from a blow; after a short premonitory stage, consisting of an acute headache, sickness, and faintness; or with sudden hemiplegia. In whatever way it may commence, the fit is characterized by complete insensibility, accompanied by slow and noisy, or stertorous and puffing breathing; impeded deglutition; flushed and livid countenance; prominent and motionless eye, with (generally) a contracted pupil; the limbs are either motionless or rigid, or convulsed, or these several states exist on one side, or in one limb, and not on the other or in the rest. The bowels are either obstinately confined, or the evacuations are passed involuntarily; the urine also is either passed involuntarily, or being retained till the bladder is full, dribbles away. The pulse is full, strong, and quick; but sometimes more and sometimes less frequent than natural.

In some cases of apoplexy the patient does not lose his senses entirely, but the organs of speech being paralyzed, expresses himself by signs.

Apoplexy is sometimes preceded for a considerable period by premonitory symptoms, such as giddiness, headache, a sense of pressure and constriction in the head, confusion of ideas, incoherence, loss of memory, faltering speech, hæmorrhage from the nose, flashes of light, noises in the ear, visual spectra, double vision, transient blindness or deafness, drowsiness, numbness of the extremities, pallor, nausea, vomiting, and faintness.

TERMINATIONS.—Suddenly in death. In death, after a variable interval. In complete recovery, which is commonly preceded by vomiting and profuse perspiration. In partial recovery, with more or less impairment of mind, and more or less extensive paralysis.

ANATOMICAL CHARACTERS.—In *congestive* or *simple* apoplexy, distension of the vessels of the brain, with or without effusion into the ventricles, or at the base of the brain. In *hæmorrhagic apoplexy*, effusion of blood in the substance of the brain, into the ventricles, at the base, or on the surface: in *serous* apoplexy, effusion of serum in the ventricles, or under the arachnoid, on the surface, or at the base of the brain.

CAUSES.—*Predisposing.* A certain age: from the fiftieth to the eightieth; the liability increases as age advances. Few cases occur under twenty, and very few indeed in childhood. A certain make of body, combining a short, thick neck, large chest, florid complexion, and stout person, but the disease sometimes occurs in persons of the very opposite conformation; hereditary tendency; indulgence in the luxuries of the table; suppression of usual evacuations; intense study; sedentary life; plethora, however induced; hypertrophy of the left ventricle of the heart; diseases of the valves of the heart; metastasis of gout or rheumatism; and repression or non-appearance of exanthematous eruptions, as variola, rubeola, or scarlatina.

Exciting.—Violent exercise; strong expiratory efforts, as in singing and playing on wind instruments: suddenly rising from the stooping posture: straining at stool, &c.; sudden emotions and violent passions of the mind; exposure to intense cold or heat; sudden or long stooping; pressure on the neck; venereal excesses; overloading the stomach; certain narcotic substances, such as opium, alcohol, and the narcotic gases.

DIAGNOSIS.—From the effect of spirituous liquors, by the odour of the breath. From the effect of narcotic poisons, by the history of the case. In narcotic poisoning, the patient can generally be roused for a short time, and rarely loses the use of speech.

PROGNOSIS.—*Favourable.* Youth. The senses little impaired; the function of respiration not much affected; hæmorrhage from the nose or hæmorrhoidal vessels; diarrhœa; profuse perspiration; a sudden attack, if not immediately fatal, as compared with an attack preceded by premonitory symptoms of long continuance.

Unfavourable.—Protracted beyond the third day; increased frequency of pulse from the first, or after an interval. Any of the characteristic symptoms in a very marked form; involuntary evacuations; retention of urine; cold extremities; cold and clammy sweats.

TREATMENT.—During or immediately after the fit. The first thing to be done, in all cases, is to loosen the patient's neckerchief and shirt collar, raise his head, or place him, if convenient, in a chair, and open the window of the apartment. If the face is turgid and the eye injected, or if the face being pale, the pulse is full, hard, and jerking, we open a vein, and allow the blood to flow till the approach of syncope, taking care that the patient does not faint. If, on the other hand, the face is pale, and the pulse feeble and intermittent, the patient must be treated as if he were in a fainting fit, and the bleeding must be postponed till decided reaction has occurred, and the symptoms just stated have shown themselves.

In the after-treatment, the *indication* is to reduce the action of the heart, and diminish the force of the circulation through the brain.

1. By bleeding from the arm at intervals, from a small orifice, in the semi-erect position, and with constant reference to the effect produced upon the pulse, and aspect of the patient, whenever and so long as there are evidences of fulness of blood, or excitement of the circulation. The paleness of the countenance must not prevent us from bleeding when the pulse is strong; nor the weakness of the pulse, when the face is turgid, and the eyes injected.
2. The application of leeches and cupping-glasses.
3. Drastic purgatives, of which croton oil, in doses of one or two drops, is the most easily used and most efficacious. Purgative enemata.
4. Cold to the head, if the surface is hot.
5. Counter-irritants to the back of the neck, sternum, or legs, and, after a time, to the scalp.
6. A strictly-regulated diet, consisting at first of simple farinaceous food, for which a more generous diet must be cautiously and gradually substituted.
7. If the disease take place soon after a full meal, an emetic must be employed; or an attempt must be made to evacuate the stomach by tickling the fauces with a feather.

When apoplexy arises from suppression of the menstrual or hæmorrhoidal flux, we should apply leeches to the vulva, or about the anus. When there is profound coma or collapse, we should apply irritating liniments to the legs, thighs, and neck, and if these fail, and life is nearly extinct, we should pour boiling water over the extremities, or apply nitric acid to the nucha: the hot-air bath, or stimulants, in such cases, have produced reaction; and when this happens, depletion may be necessary.

When apoplexy supervenes after a retrocession of gout or of acute rheumatism, we should irritate the affected joint by sinapisms, blisters, hot turpentine, or antimonial ointment: depletion in such cases is generally injurious.

If the patient cannot swallow, great care is required lest anything get into the glottis, and cause suffocation, and when this is likely to happen, all attempts to administer nourishment in this way should be abandoned, and mechanical means resorted to.

In this disease, as in the last stage of typhus, we must examine the hypogastrium daily, and draw off the urine, if necessary.

When convalescence commences, we should regulate the bowels, employ counter-irritation on the neck, insert an issue or seton in that situation, or in the middle of the arm, or on the external surface of the knee. When paralysis ceases in one limb, and seizes another, we must resort to general and local bleeding, counter-irritation, purgatives, &c., provided the general symptoms justify the use of active measures.

In the treatment of apoplexy, in all its stages, it is important not to carry depleting measures to an extreme. An undue activity in this respect has doubtless led to fatal consequences. Severe antiphlogistic measures are also decidedly contraindicated in aged and feeble persons, in whom it will suffice to keep the bowels somewhat more open than usual, and to regulate the diet, avoiding, or prescribing, wine and other stimulants, according to the state of the system.

PROPHYLAXIS.—As apoplexy depends on a determination of blood to the head, and generally on a plethoric habit, we should advise in persons predisposed to the disease, a total abstinence from ardent or fermented liquors, spirits, wines, porter, ale, &c., great moderation in the use of animal food, and careful avoidance of all food which is either difficult of digestion, or which the patient may have found to disagree with him. In extreme cases, a vegetable or a milk diet must be insisted on; and on the recurrence of symptoms threatening apoplexy, a greater strictness of diet, and a more open state of the bowels; and if these do not remove the symptoms, dry cupping to the neck, or the abstraction of blood, by cupping from that part, must be resorted to. Hot rooms and late suppers must be avoided. The patient should take regular exercise in the open air, and the bowels should be kept regular. The patient should wear nothing tight about the neck or waist.

For the treatment of paralysis following apoplexy, see Paralysis.

CHRONIC DISEASES OF THE BRAIN.

There are several chronic diseases of the brain, such as softening, induration, hypertrophy, atrophy, abscess, scrofulous, cancerous, and other tumours. The symptoms and diagnosis of these diseases are extremely obscure and uncertain, and the same symptoms may be present in very different states of the organ.

It would, therefore, answer no good purpose to enter into a minute description of them. The presence of convulsions, and of rigidity or paralysis of the limbs, would indicate disease of the brain or spinal cord; similar affections of the muscles of the face (with the exception of paralysis of the facial nerve, which is often due to a local affection of this nerve itself), paralysis of the muscles of the tongue, affections of the organs of sense, and impairment of the several faculties of the mind would indicate disease of the brain. The nature of the disease may also sometimes be inferred from the history of the case. Thus, the presence of tubercles in the lungs, or in the peritoneum, would lead to the inference that any existing disease of the brain might be of a scrofulous nature, and so of other malignant degenerations. Individual symptoms, too, furnish a probability of particular diseased conditions. Thus, rigid contractions of the limbs, or general and long-continued convulsions, afford a probability of inflammatory softening of the brain: extensive paralysis, of a more chronic form of the same disease. The treatment of all such cases must be guided by existing symptoms, and the state of the constitution.

In many cases, chronic diseases of the brain are unattended with any symptoms which could lead us to suspect their existence. Thus, we have it on the authority of Louis, that out of twenty cases of fungus of the dura mater, three only had cerebral symptoms of any kind; and chronic abscesses, hydatids, cysts, exostoses, &c., sometimes attain uncommon size, without any attendant symptoms of cerebral disorder.

DISEASES OF THE SPINAL CORD AND ITS MEMBRANES.

Myelitis	Inflammation of the Spinal Cord.
Acute Spinal Meningitis .	Acute Inflammation of the Membranes of the Cord.
Subacute Spinal Meningitis	Spinal Irritation.
Hydrorachis	Spina Bifida.
Spinal Effusions and Tumours.	

The spinal marrow and its membranes are liable to the same diseases as the brain and its coverings: to inflammation (myelitis), followed by softening, suppuration, induration, effusion, &c.; to inflammation of its several investing membranes (meningitis); to effusions of blood, and of serum (hydrorachis); and to tumours of the medulla spinalis and its tunics. To these may be added relaxation, incurvation, excurvation, and lateral inflection of the spine itself. It is important to bear in mind that the symptoms of disease of the spinal cord, like those of inflammation of the brain and its membranes, are even less uniform than those belonging to diseases of other parts.

MYELITIS—INFLAMMATION OF THE SUBSTANCE OF THE CORD.

Symptoms.—A dull aching pain in the part affected; loss of sensation and voluntary motion, or numbness and impaired sensibility, with feebleness of the upper or lower extremities, or of both; or the nerves of sensation and voluntary motion are affected separately, leading, in the latter case, to convulsive and tetanic affections of different parts of the body. There is no derangement of the intellectual faculties, unless when the inflammation extends to the brain. The symptoms vary with the seat of the disease.

When the cervical portion of the spine is affected, there is rigidity of the neck, permanent contractions or convulsions of the superior extremities, succeeded by paralysis, with difficulty in swallowing, difficult respiration, and a sensation of tightness around the chest and in the epigastrium.

When the dorsal portion is affected, the body is sometimes agitated by continued convulsive motions, and there are palpitations, difficult respiration, and sense of constriction in the abdomen.

When the lumbar portion is inflamed, there are similar affections of the inferior extremities, with constipation and retention of urine, or involuntary evacuations. Impotence is also a common consequence of disease of this portion of the spinal marrow.

In some cases the disease comes on insidiously, is unaccompanied by pain, and is finally succeeded by paralysis of the bladder, rectum, and inferior extremities. It is sometimes confounded with lumbago, rheumatism, incipient spinal curvature, and neuralgia of the lower limbs.

CAUSES.—Blows and falls; violent exertions; exposure to wet and cold. Caries of the vertebræ; scrofulous disease.

DIAGNOSIS.—From disease of the brain by the intellectual faculties being unimpaired; and by the absence of the symptoms detailed under PHRENITIS.

PROGNOSIS.—Unfavourable. Complete recovery is very rare; but the disease may assume a chronic form, and life may be prolonged for several years.

TREATMENT.—Leeches or cupping to the part affected, followed by counter-irritation in the neighbourhood of the part, by blisters, issues, or setons, or by the tartar-emetic ointment; aperient medicines; rest; constant attention to the state of the bladder, and scrupulous cleanliness. The water-bed or the rheiocline should be resorted to in the more severe class of cases. In other respects, the treatment must be that adapted to the existing state and strength of the patient.

ACUTE SPINAL MENINGITIS—ACUTE INFLAMMATION OF THE MEMBRANES OF THE CORD.

SYMPTOMS.—Pain in the parts affected, increased by motion, percussion, pressure, or heat. The pain, which often closely resembles that of rheumatism, and is brought on or increased by motion, extends along the back, and to the limbs, which are sometimes painful to the touch; or it shoots round the abdomen or chest. Rigors are also sometimes present. There are contractions of the back and neck, and of the limbs, varying with the seat of the disease, and assuming the form of trismus, torticollis, partial or complete opisthotonos, or general tetanic spasms. Sometimes, in the place of tetanic spasms, there are convulsions, or the symptoms of chorea. There is a sense of constriction in the neck, abdomen, or chest, with urgent feelings of suffocation. To these symptoms are occasionally added retention of urine and obstinate constipation.

The progress of the disease is rapid, and it generally proves fatal from the tenth to the fourteenth day.

Causes.—The same as in inflammation of the substance of the cord.

Diagnosis.—From lumbago, by the tenderness on pressure over the spinous processes, and in most cases by the coincidence of rigid spasm or paralysis.

Prognosis.—Less unfavourable than where the substance of the spinal marrow is inflamed; but attended with considerable danger.

Treatment.—Venæsection, leeches, and cupping to the part affected, followed by counter-irritants, active aperients, a strict antiphlogistic diet, and perfect rest. The state of the bladder should be ascertained, and the urine, if necessary, frequently drawn off. After general and local bleeding, the application of ice to the affected portion of the spine is likely to be attended with great benefit. For this purpose it may be conveniently enclosed in a bladder. Counter-irritants may be, at the same time, applied in the neighbourhood of the part. Benefit will also be derived from the use of mercury, so as to affect the system. When collapse supervenes, these measures are to be discontinued, and the strength must be supported by diffusible stimuli and by stimulating injections.

When the disease becomes chronic, and there is paralysis with shaking or stiffness of the limbs, a more permanent form of counter-irritation by issues, setons, and moxas, may be instituted with advantage.

SUBACUTE SPINAL MENINGITIS—SPINAL IRRITATION.

Symptoms.—Pain in the affected portion of the spine, increased by firm pressure, percussion, or heat. Pain in the left side, under the false ribs, or in all the muscles of the chest, or muscular pain of the most acute kind over the whole of the abdomen, shortness of breath, palpitation of the heart, hysteria, nervousness, depression of spirits, irritable temper, disordered bowels, constipation, flatulence, and deficient, excessive, or depraved menstruation.

Sometimes these disorders, which are often of long continuance, are aggravated after marriage, but especially during lactation and pregnancy; the sufferer is constantly complaining of pains or unpleasant sensations of all parts below the affected vertebræ.

On making firm pressure with the index and middle finger of the right hand on the vertebræ from the neck to the lumbar region, or striking the several vertebræ successively, we discover one or more painful points. On striking the vertebræ, the pains in the side, chest, or abdomen, are immediately increased; or darting pains in those parts are produced, if they did not previously exist. In some instances these superficial pains are accompanied by convulsive movements of the muscles of the trunk.

CAUSES.—*Predisposing.* The female sex. This is a common disease in young females, and is sometimes associated with distortions of the spine.

Exciting.—Sedentary pursuits, tight lacing, want of active exercise, constipation, painful menstruation, leucorrhœa; the original cause and the effect continuing to react upon and increase each other. Spinal irritation may exist in other diseases, as in spasmodic asthma, chorea, &c. When the symptoms associated with spinal irritation are more severe than those now described, the disease belongs more properly to acute meningitis.

RATIONALE.—The tender state of the spine is the middle link between some remote irritation of the uterus or intestinal canal, and the pains in the muscles of the chest or abdomen. The irritation travels through the nerves of the part affected to the spine, where it first becomes sensible, and thence is reflected as pain to the muscles of the chest or abdomen. The connexion of the muscular pain with the tender spine is evidenced by the effect of percussion of the spine in producing or increasing it; and where convulsions are combined with the pain, those convulsions are also produced by striking the spine. In the more severe cases of spinal irritation, which closely border on acute spinal meningitis, pressure on the spine causes both acute pain and violent convulsive or tetanic movements, and the slightest pressure on the site of the reflected pain will also cause convulsions. Pressure or percussion upon other parts of the skin, or on the spine above the affected portion of the spinal cord, are unattended either by pain or convulsions. (G.)

DIAGNOSIS.—From general cutaneous tenderness, by the absence of pain on pressing the base or spine of the scapula, or other projecting portion of bone.

PROGNOSIS.—*Favourable.* The disease is generally amenable to treatment. If neglected, it may pass into the acute form, and so prove fatal.

TREATMENT.—*Indications.* I. To subdue the tenderness of the spine. II. To remove the cause of it. III. To remove the muscular pain.

I. The first indication is fulfilled by the application of leeches or cupping-glasses to the tender part of the back, followed by blisters or the antimonial ointment; and in less severe cases, by the antimonial ointment alone. (The best proportion for the ointment is a drachm of tartar-emetic to an ounce of lard. In cases of extreme tenderness, a drachm of the pulvis opii may be added to the ointment.)

II. The second indication requires aperients and alteratives, and remedies adapted to the particular disease or disorder of the bowels or uterus.

III. The third indication is fulfilled by hot fomentations, or by the emplastrum saponis c. opio, or the emplastrum belladonnæ, applied to the part affected.

In most cases where there is simple spinal irritation, without deformity, a cure will be effected by counter-irritation, with or without local depletion, a course of aperient medicines, and attention to the general health.

HYDRORACHIS—SPINA BIFIDA.

This disease is congenital, and consists in one or more tumours on the lumbar, dorsal, or cervical vertebræ, which communicate with the medulla spinalis. The tumour varies in size, is often transparent, and the colour of the skin may be natural, reddish, or livid. If pressure be made on the tumour, it induces signs of compression of the brain. The limbs are imperfectly developed, and the rectum and bladder are often paralysed. The skin may be absent, and in this case the tumour is covered by the dura mater, pia mater, and arachnoid membrane; and the pia mater is congested and red.

In some cases, the lateral arches of the corresponding vertebræ are separated or wanting. The cavity of the arachnoid contains a fluid, which may be serous, transparent, sanguinolent or purulent; may communicate with the brain; or be merely enclosed in the pia mater. In other cases, there is a division of the medulla, or it is entirely absent where the tumour is situated.

TREATMENT.—Moderate pressure has been employed to excite the absorbents to remove the effused fluid; but this is scarcely ever effected. Sir Astley Cooper used a small truss for the purpose. When this failed, he punctured the tumour repeatedly with a fine needle, and again applied pressure. Subsequent experience has proved that both plans are ineffectual, and that the disease does not admit of cure.

SPINAL EFFUSIONS AND TUMOURS.

Serous effusions occur within the spinal canal, as well as in the skull, and may be situated external to the dura mater, or within it, or beneath the arachnoid membrane, which invests the medullary cord.

Extravasation of blood may occupy the same situations, and is induced by falls, blows, slips, or other injuries of the spine, or by violent efforts, as pulling on boots, drawing a cork, or raising a heavy load. It is also a fact that effusions of blood have been found in cases in which no accident had occurred, the symptoms being pain in the back, spasmodic contractions of the muscles, paralysis of the bladder, rectum, and lower extremities, convulsions, or coma, and death.

The membranes of the spinal cord may be thickened and indurated, like those of the brain, and from the same causes. In some cases there are fungous growths on the dura mater, which produce pressure and paralysis.

The substance of the spinal cord may also become firmer than natural, after congestion or inflammation. It is subject, in common with the brain, to atrophy and hypertrophy, to tuberculous deposits, and carcinomatous degeneration, to hydatids and to aneurismal and other tumours. The diagnosis of all these organic affections is very difficult and uncertain, the prognosis unfavourable, and the treatment chiefly palliative. When accompanied by decided marks of inflammation of the substance of the cord, the treatment is the same as for Myelitis—antimonial ointment, issues, setons, and other counter-irritants to the part affected, aperients, and perfect rest.

The spinal marrow is also liable, like the brain, to concussion and compression, induced by external injuries, whether inflicted on the back, or by falls on other parts of the body. The treatment is similar to that employed in the same diseases of the brain.

DISORDERS OF THE NERVES OF SENSATION.

NEURALGIA	Nervous pain.
NEURALGIA FACIEI . . .	Tic Doloreux.
HEMICRANIA	(See Cephalalgia, p. 327.)
SCIATICA	
ANÆSTHESIA	Loss of Sensation.
ANÆSTHESIA FACIEI . .	

NEURALGIA—NERVOUS PAIN.

Pain is not only a symptom of almost all acute diseases, but also a distinct affection of the nerves themselves. To this latter the term neuralgia is applied. It may have its seat in any of the nerves of common sensation, and in some instances affects those of organic life.

Neuralgia may arise from many causes; sometimes no cause can be discovered either during life or after death: in which case the disease is attributed to a change in the condition of the nerve itself; such are some cases of tic doloreux. In other instances it is the consequence of a debilitated state of system, and follows prolonged lactation, long-continued and excessive discharges, or exhaustion from loss of blood. It also occurs in anæmia. In another class of cases it is confined to one side of the head and face, and assumes an intermittent character, and may often be traced to the same cause as ague. In many instances, pain is due to some remote irritation, and is termed sympathetic. Examples of sympathetic neuralgia are the pain in the shoulder, so common in affections of the liver, and pains in the upper arm in certain cases of diseased heart. Here there is a well-known connexion between the nerves supplying the diseased organ and those going to the seat of pain. In other instances of sympathetic neuralgia, no such connexion exists. Thus, common tic doloreux has been distinctly traced to acidity of the stomach, or an overloaded state of the intestines; and in one case, with which the editor is but too familiar, it has an obvious connexion with diseased kidney. Another class of cases may be traced to pressure or irritation at the root of the nerves supplying the seat of pain. A spicula of bone, or a fragment of a foreign body, irritating the nervous trunk, is a common cause of severe and inveterate forms of neuralgia. Examples of the same form of disease are, pain in the glans penis from stone in the bladder, pain of the thigh and testicle from irritation of the kidney, pain in the back of the thigh and leg from constipation, and pain at the verge of the anus from the same cause. Distension of the hollow viscera by gas, as in colica-pictonum, and in severe flatulence, are other examples of neuralgia from pressure. Another interesting and important class of pains are *reflected* pains, generally situated in the parietes of the chest or abdomen, and very frequently in the left side. They are treated of under the head of Spinal Irritation (p. 347). Pains of the internal viscera, without symptoms of inflammation, form another class of neuralgic affections. Gastrodynia, enterodynia, and hysteralgia, are examples of pain in the organic nerves of the stomach, intestines, and uterus. Inflammation of the neurilemma is another cause of neuralgia, and combines heightened sensibility with pressure.

NEURALGIA FACIEI—TIC DOLOREUX.

Symptoms.—The disease generally occurs in middle-aged adults, and affects both sexes, consisting in most acute pain coming on at variable intervals, suffering considerable abatement, or entirely disappearing without assignable cause for days, weeks, months, or even years together. The pain is at first confined to a limited spot, its most frequent seat being the right infra-orbital nerve. It is of the acute lancinating kind, compared to electric shocks, or it is a severe burning sensation. Sometimes the pain is the only symptom, but more generally there is some determination of blood to the affected part, with an increase of secretion. If the eye is affected, there is a large secretion of tears; if the mouth or jaw, a copious flow of saliva. After it has continued some time, it is apt to involve other branches of the nerve first affected. Thus, if it begin beneath the orbit it spreads to the upper lip, thence to the upper and lower jaw, and at length it may mount over the orbit, extend over the entire scalp, and even for a considerable distance down the spine. The general health is very little affected; the patient, in spite of the most intense suffering, recovers his flesh and healthy aspect in a few days of intermission, and often attains a very advanced age. This form of neuralgia is sometimes functional and disappears entirely, or it may depend on irritation of the root of the nerve within the cranium, or even on remote organic disease. In more than one case it seems to have had an evident connexion with diseased kidney.

Diagnosis.—From *hemicrania*, by the absence of the intermittent character; and in general by its more limited extent. From *brow ague*, by the same, and by its position, which is generally beneath the eye.

Prognosis.—Generally *unfavourable*, but more so when it is of long continuance, and when the general health is unimpaired. The presence of functional disease, or of a state of health admitting of improvement by medical treatment, is ground for a *more favourable* prognosis. The disease is rarely fatal, and sometimes disappears in old age.

Treatment.—This depends upon the cause. If there be pressure, it must be removed, if possible; if irritation at the root of the nerve, depletion or counter-irritants as near as possible to the seat of the disease; if there be inflammation of the nerve itself, antiphlogistic measures; if debility, tonics and stimulants according to the degree of it; if anæmia, steel; if indigestion or constipation, medicines appropriate to those disorders; but if the health be good, care should be taken not to impair it, for debility always increases the suffering, and so does increased determination of blood to the part affected. If the jaw be the seat of the suffering, the patient should not be salivated; if blisters are applied, it should be at some part remote from the seat of the disease.

Remedies.—The *constitutional* remedies in common use are narcotics and tonics in combination; a favourite medicine consists of quinine in two or three grain-doses, with equal quantities of extract of conium, or with half a grain, cautiously increased to two grains, of extract of stramonium. The carbonate of iron and the sulphate of zinc have also been given in full doses. Arsenic has been tried; narcotics, too, have been used; strychnia has been given, and creosote; and, indeed, every active remedy in the Pharmacopœia. Patients have appeared to be benefited by all of them. Change of air and scene, and the use of mineral waters, have seemed to effect a cure. Croton oil in combination with the compound extract of colocynth and the compound galbanum pill was recommended by Sir Charles Bell. One or two drops of the oil well mixed with a drachm of the extract, is divided into five-grain pills, of which one is given every night, with ten grains of the compound galbanum pill. A remedy strongly recommended by Dr. Watson in an affection of the nerves of the lower jaw allied to neuralgia, is muriate of ammonia in half-drachm doses three times a-day. Chloroform, from ten to twenty drops, sprinkled upon a handkerchief, and cautiously inhaled, may be resorted to, to afford occasional relief from suffering; or a few drops of chloroform may be applied directly to the seat of the pain.

Among *local* applications, extract of belladonna and veratria ointment (one grain of aconitine to one drachm of cerate) are the most effectual. A small portion of this ointment should be smeared over the track of the nerve every day, or twice daily. An ointment containing two scruples of iodide of mercury to the ounce has also been recommended.

In a case of tic doloreux of many years, standing, which had spread from the infra-orbital nerve to the upper and lower jaw, over the scalp and down the spine, accompanied by the most excruciating suffering, after tonics and narcotics, bleeding, blistering, and salivation, had been tried in vain, and nothing afforded any relief, a stream of cold water poured upon the forehead, and allowed to trickle over the face and neck, procured refreshing sleep after the lapse of about five minutes, had the same effect on a repetition, and was followed by the first good night the patient had had for weeks. In this case the paroxysms are always accompanied with determination of blood to the parts affected, with increased heat of surface. Where these characters are absent, cold may be expected to prove less efficacious. (G.)

The rational treatment in idiopathic cases appears to be this. Weaken the patient as little as possible, avoid producing inflammation of the part affected, and combat the more severe paroxysms by a stream of cold water poured over the part, or by the application of ice. In cases of sympathetic neuralgia, attend to the general health, and remove all exciting causes of direct or remote irritation.

Other neuralgic affections, such as sciatica, when not merely a form of rheumatism, are to be treated on the same general principles, and by the same remedies, as tic doloreux. The indications for the treatment of all neuralgic affections are the same, whatever may be their seat.

SCIATICA.

Symptoms.—Acute aching or darting pain extending along the course of the sciatic nerve from the nates to the knee, and in some cases, to the ankle. The pain is generally increased by firm pressure in the course of the nerve.

Causes.—The pressure of accumulated fæces, or of tumours in the course of the nerve. The ordinary causes of neuralgia in other parts.

Diagnosis.—From *muscular rheumatism* by the pain being limited to the course of the nerve, and being little, if at all, affected by the motion of the limb. In the form of sciatica which is dependent on constipation, the pain is generally increased by every effort to relieve the bowels.

Prognosis.—With the exception of the form of sciatica dependent on constipation, the disease is often very obstinate, and difficult of cure.

Treatment.—After unloading the bowels completely by brisk aperients, the abstraction of blood by cupping or leeches applied to the nates in the course of the nerve. Dry cupping in the weak and aged. The warm or vapour bath. Friction. Aperient medicines so administered as to keep the bowels free. The general and local remedies recommended in neuralgia faciei.

ANÆSTHESIA—LOSS OF SENSATION.

Varieties.—*Anæsthesia*, paralysis of the nerves of sensation; *amaurosis*, of the retina; *cophosis*, of the auditory nerve; *anosmia*, of the olfactory nerve; *ageustia*, of the gustatory nerves.

Anæsthesia, or loss of common sensation, may occur separately or combined with paralysis of the voluntary muscles; it may be universal or partial, confined to one side or extending to both, and it may affect any part of the body. Facial anæsthesia is a well-known form of this disease. Numbness combined with the loss of power in the hands and forearms, is not an unfrequent symptom in mimosis inquieta. (See p. 232.)

The **treatment** must depend entirely on the pathological condition by which it is induced—if by pressure, the cause must, if possible, be removed; if by deficient supply of blood, stimulants must be resorted to; if by cold, the circulation must be restored. In other cases the treatment will be that of the other diseased conditions with which it is associated. It rarely presents itself for treatment as a separate malady.

ANÆSTHESIA FACIEI.

Symptoms.—Loss of sensation in the forehead, cheek, nose, and chin, on one side of the face; also in the lips, inside of the mouth, and surface of the eyeball, generally accompanied by paralysis of the temporal and masseter muscles on the same side. This loss of sensibility to the touch is sometimes attended by intense pain of the parts affected.

Rationale.—Injury to the fifth pair of nerves by disease, compression, or mechanical injury.

Prognosis.—Favourable, if uncombined with anæsthesia or paralysis of other parts, or with symptoms of disease of the brain.

Treatment.—Local depletion by cupping or leeches to the temples, followed by fomentations. The internal use of mercury, so as slightly to affect the gums. If the disease, in spite of this treatment become chronic, small blisters in front of the ear, kept open by savin ointment.

DISEASES AFFECTING THE NERVES OF VOLUNTARY MOTION.

Paralysis	Palsy.
Tremor Mercurialis	Mercurial tremors.
Lead Palsy	Dropped hand.
Paralysis Agitans	Shaking palsy.
Epilepsia	Falling sickness.
Catalepsia	Catalepsy.
Chorea	St. Vitus's Dance.
Hysteria	Hysterics.
Tetanus	Locked jaw.
Hydrophobia	Canine madness.

PARALYSIS—PALSY.

Species.—1. Hemiplegia; 2. Paraplegia; 3. General Paralysis; 4. Facial Paralysis. 5. Partial Paralysis. 6. Paralysis of the Insane.

1. HEMIPLEGIA.

This is the most common form of paralysis, and occurs most frequently on the left side. It often occupies exactly one-half of the body. In most cases it comes on suddenly, sometimes preceding and sometimes following an apoplectic attack. Occasionally, like general paralysis, it makes its approaches gradually.

SYMPTOMS.—The disease may extend to the entire half of the body, or it may affect only one extremity; and it may consist in a partial or complete loss of power in the parts affected. The symptoms in a well-marked case of hemiplegia affecting one-half of the body are the following. The limbs of the affected side, if raised, fall by their own weight; the face of the same side is relaxed and void of expression, and drawn to the sound side; the tongue when protruded is thrust towards the palsied side; the speech is either lost, or it is thick, muttering, and unintelligible. In rare instances, the mouth is drawn to the affected side, and the tongue protruded towards the sound side. The loss of power is sometimes accompanied by loss of sensation, but in a few instances with heightened sensibility; the temperature of the affected side is generally much lower than that of the sound side, but occasionally it is raised above it. The mental faculties are sometimes unimpaired; but they generally suffer, as is shown by impaired memory, confusion of thought, loss of power of attention, change of character, irritable temper, depression of spirits. The pulse is often infrequent, but sometimes above its usual standard, the respiration also is slow, and the bowels generally inactive. If the patient does not speedily recover, the palsied limbs shrink and grow cold; if he recovers, the leg commonly first regains its power. When the disease is partial, the arm is more commonly affected than the leg. If the power of the limb is merely impaired and not lost, the arm will be raised with difficulty, and often not without the assistance of the other, the hand cannot grasp firmly, the leg will be dragged after the sound limb, and in walking the patient will be very liable to trip. In cases of recovery the leg generally recovers its power first; so that the patient can walk about, while the upper extremity still remains without power of motion.

CAUSES.—*Predisposing.* The same as in apoplexy. (See Apoplexy, p. 341.) *Exciting.* An apoplectic seizure. Lesions of the spinal cord, affecting one side only. Pressure on the large vessels supplying the brain on the opposite side to the seat of the paralysis. Disease of the mitral valve, leading to detachment of a portion of the valvular deposit, its lodgment in one of the cerebral arteries, and the softening of a portion of the brain. This form of hemiplegia sometimes occurs in very early life.

DIAGNOSIS.—From hysteric hemiplegia by the history of the case, and the coincidence of other hysteric symptoms. (See Hysteria.)

PROGNOSIS.—*Favourable*, in proportion as it is recent, partial, and incomplete, and when the patient is young; *unfavourable*, when extensive, of long standing, amounting to perfect loss of power, and occurring in advanced life. When combined with anæsthesia, a return of sensation, tingling, and increased temperature, are favourable circumstances.

2. PARAPLEGIA.

Paraplegia or paralysis of the lower half of the body, or of both lower extremities, like other forms of paralysis, may occur either gradually or suddenly. Sometimes it is complicated with head symptoms, but more frequently these are absent.

SYMPTOMS.—When paraplegia is complete, there is entire loss of sensibility and motion in the lower extremities, with paralysis of the bladder and rectum. The patient being confined to the horizontal position, the back and sacrum are apt to slough. The urine is generally highly ammoniacal, and is prone to form calculous deposits. In these cases, the urine should be frequently drawn off, and the bladder cleansed with warm water; great attention must be paid to cleanliness, and the patient should, if possible, be provided with a water-bed or rheiocline.

In less complete forms of paraplegia, there is weakness of the lower extremities, with a sensation of stiffness and heaviness, numbness, tingling, or formication, and an awkward straggling gait. These symptoms gradually increase in severity until perfect paraplegia with paralysis of the bladder and rectum set in. In many cases the disease does not prove fatal till it has involved the upper extremities. In many cases of paraplegia, and especially in the more complete forms of it, the reflex function remains entire, and irritation of the sole of the foot occasions involuntary contractions of the muscles.

CAUSES.—Injuries to the spinal cord explain the majority of cases which occur suddenly; those of gradual occurrence are generally traceable to some chronic disease of the cord or of its membranes; or to increasing pressure from growing curvature of the spine. The disease may also arise from caries of the vertebræ and relaxation of the spinal ligaments. Also from pressure on the descending aorta. Cold, intemperance, excessive sexual intercourse, and self-abuse may also give rise to it.

PROGNOSIS.—Favourable, but guarded, in cases dependent on cold, intemperance, and sexual excesses; but highly unfavourable in cases accompanied by indications of disease of the spinal cord or brain. In the most favourable class of cases, recovery is generally slow, occupying several weeks or months; and, in unfavourable cases, the patient may linger for several years.

3. GENERAL PARALYSIS.

Sometimes the disease is of greater extent than is implied in either of the terms hemiplegia or paraplegia, and in this case receives the name of general paralysis. The disease comes on either suddenly or gradually; if suddenly, from extensive injury or sudden effusion of blood on the medulla oblongata, or cervical portion of the spinal marrow; if gradually, it begins in the toes or fingers, and thence extends over the entire body, and is due to chronic disease of the brain or spinal cord. In most cases, the sensibility is unimpaired; more rarely both sensation and motion are lost. The functions of the intellect generally suffer at the same time, and occasionally all the faculties of the mind are paralysed. This form of paralysis is of rare occurrence; the *prognosis* is highly unfavourable; the *treatment* the same as in less extensive affections of the same kind.

TREATMENT OF PARALYSIS.

The *indications* for the treatment of the foregoing forms of paralysis are the same. They consist: I. In the use of remedies appropriate to the diseased condition on which the palsy depends; II. In the use of remedies calculated to act directly on the parts affected; and III. In the relief of incidental symptoms.

I. For the first indication (See Apoplexy, p. 341), and the several diseased conditions of the brain and spinal marrow which give rise to paralysis.

II. This indication is fulfilled by friction with the flesh-brush, or with stimulating liniments; by blisters; by the actual cautery; by electricity (most conveniently applied by means of the electro-magnetic apparatus), and by galvano-puncture, salt-water baths, shampooing, the warm or hot-water *douche*, and, when the power of the extremities has in some degree returned, by exercise. These remedies are inapplicable in the early stage of paralysis, depending on acute disease of the brain or spinal cord. They should not be applied till all symptoms of inflammation have disappeared, and the disease has assumed a chronic form.

III. When, as in cases of paraplegia and of general paralysis, the bladder and rectum are involved, the frequent use of the catheter, and the injection of the bladder with warm water are of great importance. The patient must be kept clean, his position must be frequently changed, and if bed-sores should form, he must be placed upon a rheiocline or water-bed.

REMEDIES.—*Strychnia.* In cases not dependent upon inflammation or disease of the brain or spinal cord, and where the palsy arises from the long disuse of the limbs, or from exhaustion of the nervous power, strychnia in doses of a sixteenth or twelfth of a grain, two or three times a-day, cautiously increased, may be given with great advantage. Its action on the system is indicated by twitchings of the paralysed muscles, but these taken as indications of returning power are exceedingly delusive, as they seem to depend on an affection of the excito-motory nerves. The same remedy may be applied locally; a quarter of a grain being sprinkled on a blistered surface, near the origin of the nerves affected, or near the seat of the paralysis. *Tincture of cantharides* in doses of from twenty drops to half a drachm has been given with advantage in some cases of paraplegia. It stimulates the bladder to more healthy action, and in cases dependent on effusion into the sheath of the spinal marrow, may act favourably as a diuretic. *Oil of turpentine*, in drachm doses, suspended in any mucilaginous substance, may also be given with advantage in the same class of cases in which cantharides is beneficial.

4. PARALYSIS OF THE FACE.

The motor nerves of the face being the portio dura and the lesser, or non-ganglionic, portion of the third division of the fifth, and the sensitive nerves the first and second divisions, with the ganglionic portion of the third division of the fifth nerve, it is easy to trace facial paralysis to its source. In perfect paralysis of the face, the portio dura and motor branch of the third division of the fifth suffer jointly: when the latter alone is affected, the motions of the jaw on that side are paralysed, and in this case there is usually some loss of sensibility; but as the disease is confined to the muscles employed in mastication, there is no distortion of feature, beyond a flattening of the affected side of the lower jaw, and of the temple.

SYMPTOMS.—In palsy of the muscles supplied by the facial nerve, the expression of countenance is peculiar. The two sides of the face are not symmetrical; but the features are drawn to the sound side, so that the straight line passing through the eyebrows and mouth respectively would meet at an angle within a short distance of the sound side of the face. In other words, the sound side appears shorter and narrower than the paralysed side. The affected side is also remarkable for want of expression, and is in striking contrast with the opposite side. When the patient is desired to close the eyes, that on the paralysed side is either partially closed or remains wide open, while that on the sound side is firmly closed; if the patient is desired to blow, the air issues from the paralysed side; so also with the food, when the patient swallows, and with the saliva, when he spits. The power of whistling is also lost, and when the patient speaks, laughs, cries, sneezes, or coughs, the deformity is increased, the paralysed side remaining motionless, whilst the sound side is thrown into still stronger contortion. The cheek on the affected side is flaccid, and swells during strong expiration. The labial consonants *b*, *p*, and *f*, are imperfectly sounded. The sensation of the affected side is generally unimpaired.

DIAGNOSIS.—From *paralysis of the third division of the fifth* by the masseter and temporal muscles retaining their power.

PROGNOSIS.—*Favourable.* When the paralysis does not extend beyond the parts supplied by the facial nerve. The disease is often cured in about three weeks or a month.—*Unfavourable.* The disease, in spite of the treatment recommended below, lingering for several weeks. Inflammation of the conjunctiva, and, in rare cases, ulceration of the cornea, and destruction of the eye of the affected side are consequences of the loss of power in the muscles of the eyelids.

CAUSES.—Wounds and mechanical injuries; the pressure of tumours; effusions into and around the sheath of the nerve; cold.

TREATMENT.—If febrile symptoms are present, bleeding from the arm; in other cases, cupping or leeches behind the ear, followed by a blister to the same part; aperients as required; and blue pill or calomel given so as to affect the gums. (Pil. hydrarg. gr. iii. Pulv. opii gr. ¼, three or four times a-day.)

5. PARTIAL PARALYSIS.

Particular muscles or groups of muscles, other than those supplied by the facial nerve and lesser division of the fifth, are subject to attacks of paralysis, arising from injury limited to the root or trunk of the nerves distributed to them. *Strabismus* is caused by palsy of one or more of the muscles of the eye; *ptosis* and *lagophthalmia* by palsy of those of the eyelids (in the first, the eye is permanently closed, in the second open); *aphonia* by paralysis of the muscles of the tongue. These forms of paralysis rarely occur alone, but are commonly found in combination with more extensive palsy of the face or body. The treatment consists in local depletion by leeches or cupping, followed by counter-irritation by blisters applied as near as possible to the root of the nerve affected.

6. PARALYSIS OF THE INSANE.

The paralysis which occurs in the insane has some peculiarities. It appears at a variable interval after alienation; appears first in the tongue, and affects the pronunciation, thence extending to the extremities, of which the lower are commonly first affected, then the superior extremities and trunk. The progress of the disease is gradual, but terminates at length in complete paralysis. At last the functions of organic life suffer; there is palsy of the bladder and sphincter ani, of the muscles of deglutition, of the respiratory muscles, and death from asphyxia. The sensibility is little impaired. The common duration of this malady is four or five years.

TREATMENT.—This form of disease is dependent on progressive softening of the brain, and does not admit of cure, or of material relief by medicines. The treatment will have to be directed to the relief of such symptoms as may happen to be present in each case.

TREMOR MERCURIALIS—MERCURIAL TREMORS—THE TREMBLES.

SYMPTOMS.—The paralysis usually begins in the arms, coming on, for the most part, gradually. There is a sense of weakness, with slight convulsive twitchings, followed by tremors, increasing in violence till the patient is obliged to abandon his occupation. The trembling gradually extends to the lower extremities, and at length to the entire body. All attempts at motion bring on the trembling, which ceases when the body is at rest, or the limbs supported. The patient dances rather than walks, is unable to grasp objects, the speech is hurried and abrupt, and in extreme cases he cannot even masticate his food. If the patient continues to expose himself to the poison, restlessness, sleeplessness, and delirium supervene. Salivation is sometimes present, but in the majority of cases absent. The general health is at the same time impaired, and there are nausea and anorexia, a dry skin and a furred tongue; but there is no disorder of the circulation or respiration, or of the digestion, and no colic.

In very mild cases the symptoms are those of Mimosis Inquieta (see p. 232).

Among the minor effects of working with mercury may be mentioned a peculiar brittle state of the teeth, causing them to chip constantly, and exposing them to early decay.

DIAGNOSIS.—From *paralysis agitans*, by the history of the case, and the absence of trembling when the limbs are supported.

PROGNOSIS.—Generally favourable, if the patient can contrive to quit his employment.

CAUSES.—The process of water-gilding; employment in quicksilver mines; long exposure in any way to the fumes of mercury, or to the absorption of the oxide by the skin.

TREATMENT.—A temporary cessation of employment; a combination of tonics and sedatives (as in Mimosis Inquieta, p. 232); preparations of iron; a generous diet, with a moderate allowance of wine; the shower-bath.

PROPHYLAXIS.—Cleanliness and free ventilation of the places of work; an arrangement by which the fumes of mercury can be carried off, such as a large funnel terminating in a chimney, or in a tube, the tube being heated to occasion a draft; eggs swallowed two or three times a-day; the free use of milk as an article of diet; in those who handle mercury, the use of gloves.

LEAD PALSY—DROPPED HAND.

SYMPTOMS.—The hands are generally first affected, and in some cases the forearm also suffers. It begins by a feeling of weakness in the fingers, extending to the wrists, and rarely beyond them. There are at the same time shooting pains in the forearms, arms, and shoulders. The parts affected, after a time, waste from disuse, and the hand drops useless from the wrist. The disease is generally preceded by colic, but may occur independently of it.

DIAGNOSIS.—The seat of the palsy, assisted, in many cases, by the discovery of a blue line on the gums.

PROGNOSIS.—In many cases, recovery after a long course of treatment. The prognosis is more favourable in the first attacks and in slight cases.

CAUSES.—This form of paralysis attacks plumbers and glaziers, oil-painters, enamel card makers, fishmongers who use lead counters, men employed in lead works, and persons who drink water conducted through new leaden pipes or kept in new leaden cisterns, the danger being in exact proportion to the purity of the water.

TREATMENT.—The hand to be supported by a splint. Among the internal remedies which promise to be most useful is strychnia, in doses of from the sixteenth to the twelfth of a grain, given three times a-day, and cautiously increased. The iodide of potassium has lately been strongly recommended, and seems deserving of a trial. It may be given in five-grain doses three times a-day with any of the tonic infusions. The external remedies are electricity, shampooing, the warm-water douche, friction with the flesh-brush, or with stimulating liniments.

PROPHYLAXIS.—Scrupulous cleanliness should be observed, and especial care should be taken to wash the hands in soap and water, or in water containing soda or pearlash, before meals; sulphuric acid lemonade as a beverage; fat and oily articles of food.

PARALYSIS AGITANS—SHAKING PALSY.

Symptoms.—The approach of this affection is gradual. There are weakness and trembling, usually commencing in the hands and arms, but sometimes in the head, and gradually extending over the whole body. At length, the trembling becomes incessant; and when the patient attempts to walk, "he is thrown on the toes and fore part of the feet, and impelled unwillingly to adopt a running pace, being in danger of falling on his face at every step." In a still more advanced stage, the shaking continues during sleep; the patient cannot carry food to the mouth; mastication and deglutition are performed with difficulty; the agitation at length becomes so violent as to prevent sleep; the body is bent forward, with the chin upon the sternum; articulation is impaired or entirely lost; the urine and fæces pass involuntarily, and coma and slight delirium close the scene. In some cases, the muscles of respiration are affected, and the breathing becomes extremely frequent. (In one case occurring in a vigorous young man, 73 in the minute, with a pulse of 72.—G.)

Diagnosis.—The trembling continuing even when the limbs are supported, and the peculiar gait.

Prognosis.—Unfavourable in persons advanced in life. Less unfavourable when, as in rare instances, it occurs in persons in the vigour of life.

Causes.—*Predisposing.*—An advanced period of life.

Exciting.—Hard drinking; previous attacks of rheumatism; obscure disease of the spinal cord.

Treatment.—This must be regulated by the age of the patient and the existing state of the system. In persons advanced in life, a combination of stimulants and sedatives is indicated; in persons previously intemperate, the treatment proper to delirium tremens. In younger persons, cupping and counter-irritants to the spine, with remedies appropriate to the state of the system. If plethora is present, depletion; if great constitutional debility, preparations of steel, as the carbonate or sulphate of iron in full doses.

EPILEPSIA—EPILEPSY—FALLING SICKNESS.

SYMPTOMS.—Sudden loss of sense and power of motion, so that, if the patient be standing, he immediately falls, or is thrown to the ground, with convulsions, frequently preceded by a loud, piercing cry. During the fit there are strong convulsive motions of the limbs and trunk of the body, and spasms of the muscles of the face and eyes, producing various distortions of the countenance. The brows are knit; the eyes fixed and staring, or turned up beneath the lids so as to display the whites of the eyes. The hands are firmly clenched, and the arms are tossed about. The breathing becomes gasping and difficult, or is altogether suspended; the heart beats violently; the face is turgid and livid; foam, often bloody, issues from the mouth; the jaws are contracted with great force, so that the under lip or the tongue, if protruded, is apt to be severely injured. The fæces, urine, and semen are sometimes expelled, and there is occasionally rigidity of the penis. After a longer or shorter continuance of the convulsions, they cease altogether, and leave the patient motionless, but in a state of insensibility, and under the appearance of a profound sleep. He gradually recovers, and, if left to himself, will generally sleep for some hours.

The fit in this, its strongly-marked form, generally lasts from five to ten minutes, but sometimes is of much shorter duration. Sometimes there is a succession of fits, with intervals of torpor, lasting for several hours.

There is a form of epilepsy, of frequent occurrence, called by the French *petit mal*, in contradistinction to the foregoing, which is designated the *grand mal*. It consists in sudden and transient giddiness with loss of consciousness, confusion of mind, unsteadiness of gait, accompanied in some instances by slight convulsions. Such slight fits are often followed by a period of great confusion of intellect, and even of maniacal incoherence. (In one case that came under my notice every fit of epilepsy was followed by an unconscious exposure of the person.—G.)

Premonitory symptoms.—The fit is frequently ushered in by premonitory symptoms, such as pain in the head; lassitude; disturbance of the senses, consisting in a bright circle of colours before the eyes, or a sudden light, or muscæ volitantes, or, in rare instances, spectral illusions; or there is a loud noise in the ears, or an offensive smell, or a bitter taste: unquiet sleep; unusual dread; palpitation of the heart; coldness of the joints; fluttering at the epigastrium; vomiting; a sensation of cold, or a pain arising in some part of the extremities, and gradually creeping upwards until it reaches the head (the *aura epileptica*), when the patient is instantly deprived of his senses, and falls as above described. In the majority of cases, the fit is not preceded by any warning. The fits occur at very variable intervals; sometimes there are several in one day; in other cases, there are intervals of months or years.

Causes.—*Predisposing.* Epilepsy or insanity in parents or ancestors; scrofula; malformation of the head; the male sex? debility in nervous persons; dissipation, intemperance, self-abuse, and excessive or suppressed discharges.

Exciting.—Mechanical, chemical, or mental stimuli; especially the effects of joy and surprise; sudden fright; fits of passion, or any vehement emotion of the mind; irritation; sexual intercourse; plethora of the vessels of the head; worms; dentition; acute pain; excessive evacuations; suppression of accustomed discharges; tumours compressing the brain, or any part of the nervous system. Epilepsy sometimes occurs as a symptom of irritant poisoning; and is not infrequent in poisoning by arsenic.

Diagnosis.—From *hysteria*, by the total suspension of consciousness, the solitary cry, and the deep sleep which succeeds the fit. From *feigned* epilepsy, by the total insensibility, extending even to the retina. From *apoplexy*, by the transient nature of the fit, the absence of the stertorous breathing, and, in most cases, of paralysis. By the motions of the voluntary muscles in epilepsy being increased, in apoplexy totally suspended.

Prognosis.—*Favourable.* The disease being sympathetic, occurring before the age of puberty, and arising from obvious exciting causes easy of removal. In females being connected with some functional derangement of the uterine system.—*Unfavourable.* The reverse of the above. The disease coming on after the age of puberty; hereditary predisposition; scrofulous diathesis; long previous continuance of the malady, and frequent occurrence of the fits; misshapen skull; the epileptic physiognomy; impairment of the memory and judgment; fatuity, or paralysis.

Treatment.—I. During the fit; II. During the interval.

During the fit.—In general, little else can be done during the paroxysm than to use the necessary precautions to prevent the patient injuring himself in the violence of the convulsions, and taking care there is no pressure on the vessels of the neck. The patient should, therefore, be placed, [illegible] possible, on a soft bed, and the neckcloth and shirt-collar should be loosened. The violent convulsions may also be restrained by the bystanders. By way of precaution, and to prevent the tongue from being bitten, a piece of soft wood, or a pad of linen should be placed between the teeth. When the fit occurs frequently during sleep, and the tongue is apt to be severely bitten or torn by the teeth, the patient should wear a smooth rounded guard, fitting closely to the teeth above and below.

If there be decided symptoms of determination of blood to the head, or if the patient be of a full, plethoric habit, blood may be cautiously abstracted from the arm or nape of the neck. Cold may be applied to the head, and warmth to the extremities. After the fit, the patient should be allowed to sleep; and if much exhausted, may take some slight stimulant.

In the interval.—The recurrence of the paroxysm is sometimes prevented—

1. By removing all causes of irritation, as constipation, intestinal worms, the irritation of teething, &c.

2. By avoiding the occasional or exciting causes, such as over-distension of the vessels of the head, however induced; fits of passion, or other violent emotions of the mind; intemperance, dissipation, or other bad habits.

3. If the patient be of a plethoric habit, by occasional bleeding; abstemious diet; issues or setons in the neck; irritation in the course of the spine with antimonial ointment; frequent aperients, &c.

4. If the patient is weak and irritable, by tonics; as cinchona, quinine, sulphate, oxyde, and valerianate of zinc, sulphate and carbonate of iron, sulphate of copper, or the cuprum ammoniatum, nitrate of silver (a remedy which is objectionable as apt to cause permanent discoloration of the skin), and liq. arsenicalis; combined with regular hours, early rising, regular exercise, nourishing but not stimulating diet, and cold-bathing, or the shower-bath.

5. If the disease occur in females, the treatment must be regulated by the state of the uterine function. If amenorrhœa with anæmia, or anæmia alone, be present, full doses of steel; if amenorrhœa with plethora, the treatment proper to plethora; if dysmenorrhœa, the treatment recommended for that disease; if leucorrhœa or menorrhagia, tonics and sedatives, with astringent injections; if the nervous symptoms attendant on the change of life, and on the most debilitating diseases of the adult female (Mimosis Inquieta), the same combination of tonics and sedatives as recommended in Mimosis (p. 232).

6. If there is a syphilitic taint, mercury, or the iodide of potassium, may be given, as in other secondary cases.

REMEDIES.—*Immediately before or during the fit.* Pressure on the carotids; a ligature between the parts from which the *aura* first proceeds and the brain, as round the thumb or little finger when it begins there; a strong mental effort; violent exercise; violent irritation of the nostril with snuff, or strong smelling salts; dashing cold water over the face and head; an emetic; a full dose of opium or laudanum.—*In the intervals.*—The metallic and vegetable tonics already specified; together with wormwood; the cardamine pratensis; the misletoe and oak-bark, in doses of two drachms two or three times a-day; gratiola; mugwort; narcotics and sedatives, as opium, lactuca, conium, stramonium, belladonna, and digitalis; antispasmodics, as valerian, assafœtida, musk, and castor; nux vomica and strychnine? turpentine, recommended on high authority, and indicated wherever worms are suspected to exist; electric sparks drawn from the head? oxygen gas? In cases preceded by the aura, division of the nerve running from the seat of the aura or amputation of the part? carbonate of potash?

Where no obvious cause of irritation, and no marked deviation from the usual state of health, can be found, the treatment is, and must be, purely empirical. The balance of authority is in favour of tonics, of which the sulphate of zinc in doses increased from two or three grains up to a scruple or half a drachm, three times a-day, is the best. It may be given in combination with sulphate of magnesia, in doses sufficient to insure the free evacuation of the bowels. In confirmed cases all remedies are useless.

The most important point of the treatment is to ascertain the exciting causes, and to remove or avoid them. In the absence of an obvious exciting cause, a treatment adapted to the existing state of health; and when this is good, any of the metallic tonics with gentle aperients.

CATALEPSIA—CATALEPSY.

Symptoms.—Catalepsy is an extremely rare disease, allied to those of the present section. Its essential features are, a fixing of the body in the position in which it happens to be at the moment of the seizure, or in which it may be placed during the fit, accompanied by total insensibility. The fit itself is rarely, if ever, fatal; but the intellectual faculties seem to suffer by its frequent repetition.

A lad of about fourteen years of age, a playmate of my own, was subject from childhood to this disease. He was often seized in the midst of his sports, at irregular intervals, and without any previous warning, and fixed like a statue in the attitude in which he happened to be at the moment. The fit rarely lasted more than one or two minutes, and when it ceased, he resumed the sport in which he had been engaged with a slight air of surprise and embarrassment. He was found dead in a bath, into which he had fallen. (G.)

The *causes* of this disease are obscure, and little is known of its appropriate treatment. The general principles on which it should be conducted are the same as those of epilepsy. Existing irritation must be removed, and any occasional determination of blood to the head must be met by appropriate remedies.

CHOREA SANCTI VITI—ST. VITUS'S DANCE.

Symptoms.—The disease generally sets in with slight convulsive movements of the face or of one of the limbs, which gradually extend and increase in severity until they embrace one side of the body, or the whole frame. The lower extremity is mostly first affected; there are weakness and lameness in one of the legs; and, though the limb be at rest, the foot is often agitated by involuntary motions, turning it alternately outwards and inwards. In walking, the affected leg is seldom lifted as usual, but is dragged along, as if the whole limb were paralytic; and when it is attempted to be lifted, that motion is unsteadily performed, the limb becoming irregularly and ludicrously agitated. The arm, too, is drawn convulsively in a direction contrary to that intended, so that in attempting to raise anything to the mouth, the patient often jerks it over the head. If the arm is held out, the fingers cannot be kept steady; the eyes and countenance are strangely distorted, and the convulsive movements are generally accompanied or followed by a vacant expression of countenance. The muscles are usually quiet during sleep; but there are exceptions to this rule. The health of patients affected with chorea is generally but slightly impaired, with the exception of the digestive organs. Constipation is an almost constant accompaniment, and there is sometimes loss of appetite, a foul tongue, and offensive breath. In females, the uterine functions are sometimes disordered.

Rationale.—A disorder of the reflex function; irritation of the bowels or uterus being communicated to the spine, and reflected as convulsions on the voluntary muscles, the strange distortions of the disease being due to the conjoint action of the will and of the excito-motory system? In rare instances, the disorder originates in disease of the spinal cord itself. Short attacks of chorea sometimes follow on strong emotions of the mind.

Causes.—*Predisposing.* General weakness and irritability of the nervous system; youth (from 7 to 15 years of age); female sex. It may occur in adults of both sexes to the age of seventy.

Exciting.—Intestinal irritation from constipation or worms; uterine irritation; affections of the mind, fright, horror, anger.

Diagnosis.—From *hysteria*, by the grotesqueness of the movements, and the absence of convulsive affections of the respiratory system.

Prognosis.—Favourable in the great majority of cases.

Treatment.—*Indications.* I. To remove causes of irritation. II. To improve the general health.

I. By far the most common cause of irritation is in the bowels, and purgatives, judiciously and perseveringly administered, are the chief remedies; in most cases, perhaps, the only efficient ones. A powder or pill consisting of equal parts of hyd. c. creta and pulv. rhei (the dose varying with the age) may be given every night, and a dessert or table-spoonful of castor-oil, or other simple aperient, every morning. More active purgatives may be substituted, if necessary. The bowels should be kept open once, twice, or thrice daily, but hypercatharsis should be very carefully avoided. The evacuations should be inspected daily; and the purgative plan should be persevered in till the discharges assume a healthy appearance. In many cases, nothing more will be required.

If the sources of irritation should be found in the uterus, remedies appropriate to the existing disorder of that organ must be given. If there is tenderness of the spine, the case should be treated as one of spinal irritation (p. 347).

II. The general health may be improved by tonics, of which the metallic tonics are the best, such as the sulphate of zinc, and the sulphate or carbonate of iron, in full doses; cold bathing and the shower-bath, nourishing diet, fresh air, and regular exercise, may be prescribed with great advantage. These remedies may be used in combination with a course of aperient medicines; but whatever else is done, purgatives should never be omitted.

Remedies.—Tonics; among metals—sulphate and carbonate of iron, the oxide, sulphate, and valerianate of zinc, and arsenic; among vegetables—bark, quinine, and strychnia? narcotics, and antispasmodics; turpentine; cod-liver oil; electricity?

HYSTERIA—HYSTERICS.

Symptoms.—The disorder occurs in paroxysms or fits, generally preceded by yawning, stretching, dejection of spirits, shedding of tears, alternate flushings and paleness, difficulty of breathing, sickness at the stomach, and palpitation of the heart; there is often an acute pain in the left side, about the flexure of the colon, with sense of distension, giving the idea of a ball or globe rolling itself about in the abdomen, and gradually advancing upwards until it gets into the stomach, whence, rising to the throat, it occasions, by its pressure, the sensation of an extraneous body lodged there (*globus hystericus*). The fit having arrived at its height, the patient appears threatened with suffocation; the face is flushed, the nostrils distended, the abdomen is protruded and tympanitic, the head is thrown forcibly back, and the limbs are strongly convulsed. The patient bursts into violent fits of laughter, sobbing, or screaming, utters incoherent expressions, and is in a state of temporary delirium. The spasms at length abating, a quantity of flatus is evacuated upwards, with frequent sighing and sobbing; a large quantity of limpid urine is discharged; and the patient recovers the exercise of sense and motion, without retaining any distinct recollection of what has taken place; feeling, however, a severe pain in her head, and a soreness over her whole body.

The fit sometimes appears in a less marked form, consisting of sudden insensibility, laborious breathing, swollen neck, flushed cheeks, and a closed and trembling eyelid; and the patient recovers, crying and sobbing.

Causes.—*Predisposing.* Female sex; celibacy; the age from puberty to the fifty-fifth year; studious and sedentary life; grief; anxiety of mind; delicate health; plethora; the scrofulous diathesis. It is rare in the male sex, but liable to occur under mingled debility and excitement.

Exciting.—Constipation; dyspepsia; flatulence; excessive evacuations; suppression of the menses or lochia; plethora; violent emotions of the mind; imitation or sympathy; tight lacing, or other impediments to the breathing.

Proximate.—Spinal irritation? A tender state of spine is a common accompaniment of hysteria.

DIAGNOSIS.—From *epilepsy*, by the convulsive motions being subject to control by a strong effort of attention, whilst in epilepsy they are altogether involuntary; the respiration being sighing and sobbing, and often mixed with cries or laughter; by the insensibility not being complete; by the absence of distortion of the features, and by the peculiar trembling of the eyelid. This latter sign is of great value, for wherever it is present, whatever the name given to the disorder, whether hysteria, catalepsy, trance, or mesmeric slumber, it is a sign of safety, and strongly suggestive of cold affusion. By the marked affection of the muscles of respiration in the hysterical paroxysm. From *mimosis inquieta*, by the marked character of the fits; but hysteria is often superadded to the group of symptoms which bears that name.

PROGNOSIS.—Hysteria is very seldom attended with danger. In males affected with hysteria, there is some ground to apprehend future mental unsoundness.

TREATMENT.—I. During the fit. II. During the intermissions.

During the fit.—In general, nothing more is necessary than to dash cold water repeatedly into the face; to rouse the patient by speaking to her in a loud tone of voice, to unloosen the stays, and to apply ammonia to the nostrils. Medicines are as unnecessary as they are useless. Those usually given are assafœtida, fetid spirits of ammonia, ether, valerian, castor, opium, and all the so-called-antispasmodics.

The persevering use of cold water as a shock, not only serves to remove the existing attack, but often effects a cure, after antispasmodics have been used in vain. In a young man who had had repeated attacks of hysteria in a marked form, and who had taken the strongest and most nauseous remedies for several weeks without effect, this simple means speedily effected a cure. He has since become the victim of hopeless melancholia. I have seen a prompt and a permanent cure follow the disuse of tight-lacing. (G.)

During the intermissions.—The treatment will depend upon the existing state of the system, and the condition of the alimentary canal. The bowels must be kept free, without being irritated by violent purgatives. If there is extreme debility, stimulants will be required; if a less degree, tonics, of which the metallic tonics are the best; if plethora be present, a regulated diet; and in extreme cases, the abstraction of blood; if anæmia, the preparations of steel; if the symptoms of mimosis inquieta, a combination of tonics and sedatives. (See p. 233.) If there is spinal tenderness, blisters or tartar-emetic ointment to the spine. Disorders of the uterine functions require the remedies proper to the particular disorder present. Change of scene, cheerful society, regular exercise, and the shower-bath may be prescribed with advantage. The diseases or states of system with which hysteric fits are most commonly combined are, plethora, anæmia, chlorosis, and mimosis inquieta. (See those diseases, Chap. I. p. 223.)

As far as the mind is concerned, hysteria is most common in the perverse and irritable, and in persons of both sexes who possess little self-control. The education of young girls in the present day is admirably calculated to promote hysteria, combining an excessive mental, with a defective physical education, causing excitement of mind with bodily debility, a combination always capable, without local disease, of producing hysteria, in persons predisposed to it.

In the foregoing description, the term hysteria has been restricted to a disorder accompanied by fits, but it is usual to give to this term a much more extended meaning, and to designate as hysterical all the more obscure diseases of females. This indiscriminate usage of the term often leads to obscure and unsatisfactory views of the real condition with which we have to do. Thus, extreme tenderness of the skin of the abdomen, or neuralgic pain of the muscles, often confounded by careless observers with peritonitis, is designated as hysterical, so also with pleurodyne, which is apt to be mistaken for pleuritis. There are other affections, however, which may still, without impropriety, be designated as hysterical, such as aphonia, dysphagia, dry noisy cough, dyspnœa, hiccup, flatulence, paralysis, syncope, brow ague, irritable breast, besides a large class of anomalous nervous affections, which often closely simulate diseases of a more severe and formidable character. The mind of hysterical females is, doubtless, often in a state bordering on insanity; an intense desire for sympathy being the mainspring which sets the strange machinery in motion. The mind, in fact, is in the same state as the body; and as the convulsive movements are partly due to an excited state of the reflex function, and partly to an absence of self-control, so the extraordinary mental condition is the effect of the extension of the same condition of the nerves to the brain, accompanied by the same absence of self-control.

Hysteria is very rare in strong-minded females: and of three cases which have come under my notice in the other sex, two have occurred in men remarkable for their want of self-control, one of whom is now insane; and the third was a single attack occurring in a medical student, on the evening of his obtaining a prize for which he had long been anxiously striving. (G.)

We shall often be greatly assisted in determining the true nature of these anomalous diseases by observing one or other of the following circumstances:—1. That the patient, seeming to labour under a disease which is usually accompanied by emaciation and a decided appearance of ill-health, loses neither flesh nor colour; so that if she has long been confined to bed with paralysis, her limbs remain plump and firm; if she has not been able to swallow for weeks, or is troubled with incessant vomiting, she seems to have taken at least three meals a-day; if she has been a martyr to excruciating pain, her face is as free from wrinkles as if she never had a care or a pang. 2. That though, in some anomalous cases, the patient seems to be altogether insensible, the pulse beats as usual, the face has its natural colour, and while all other parts are motionless, the eyelids vibrate rapidly, and especially when any effort is made to rouse her. 3. That a great proportion of these affections are associated more or less with disorders of the respiratory function. 4. That the patient is, or has been, subject to flatulence, borborygma, globus hystericus, or well-marked hysterical fits. In the treatment of these disorders, it is necessary that the medical man should combine great firmness with kindness, and that he should not spare cold water. Cold affusion is the only remedy which can be relied on, and is worth a whole pharmacopœia of anti-spasmodics. (G.)

TETANUS—LOCKED-JAW.

Synonyms.—Trismus. Rigid spasm.

Varieties.—1. Traumatic Tetanus. 2. Idiopathic Tetanus; including Tetanus Neonatorum.

Symptoms.—Sense of stiffness in the back part of the neck, rendering the motion of the head difficult and painful; difficulty in swallowing; pain, often violent, referred to the sternum, and thence shooting to the back; spasm of the muscles of the neck, pulling the head strongly backwards; rigidity of the lower jaw, which increasing, the teeth become so closely set together, as not to admit of the smallest opening, when the affection is called *trismus*, or *locked-jaw*.

If the disease proceed further, it soon involves the muscles of the trunk and spine, so that the whole body is bent forcibly backwards (*opisthotonos*), or forwards (*emprosthotonos*), or to the side (*pleurosthotonos*).

At length, every organ of voluntary motion partakes of the disease; the extremities are rigidly extended; the abdominal muscles strongly retracted; the eyes fixed; the forehead drawn up into furrows; the jaws strongly closed; and the whole countenance exhibits the most shocking distortion. These violent contractions occasion the most excruciating pain. The pulse is accelerated, the respiration suspended or laborious, the heat of the surface greatly increased, and the skin covered with a profuse perspiration. A partial remission of the symptoms occasionally takes place every ten or fifteen minutes, but they are renewed, with aggravated torture, from the slightest causes, even the least motion of the patient, or the touch of an attendant. If the patient fall asleep, the muscles relax.

In fatal cases, the symptoms rapidly increase in severity; there is urgent dyspnœa, with an agonizing sense of suffocation; a cold clammy sweat; a small and imperceptible pulse; froth or bloody mucus at the mouth; the countenance becomes livid; delirium sometimes supervenes, and the patient dies exhausted, or suffocated by the rigid spasm of the muscles of respiration.

The *duration* of the disease varies. One case of acute tetanus is on record which proved fatal in a quarter of an hour; the common duration of fatal cases is from four to eight days. In cases of recovery, the duration varies from a week to two or three months.

Latent Period.—From a few minutes to ten weeks. Most common period, from the fourth to the fourteenth day.

Causes.—*Predisposing.* The male sex; robust and vigorous constitution; warm climates; the period of infancy.

Exciting.—Vicissitudes of temperature; exposure to cold, united with moisture; or to excessive heat; great fatigue; wounds, especially punctured wounds of the extremities; injuries of nerves or tendons by puncture or laceration; the presence of irritating substances in the stomach or alimentary canal (the common cause of the *tetanus neonatorum*); cessation of habitual discharges; irritation of the extremities of the nerves; affections of the mind; strychnia, and the plants of which it is the active principle; some of the more active irritant poisons.

Anatomical Characters.—Not constant. In some cases there are signs of inflammation in the spinal cord and its membranes (centric tetanus); but in many instances those parts are perfectly healthy, the disease being due to some remote irritation conveyed to the spinal marrow, and reflected on the muscles (eccentric tetanus). Traces of injury to the nerves in cases of traumatic tetanus. The muscles often ruptured and gorged with blood.

Prognosis.—Extremely unfavourable; more so when the disease arises from wounds or injury to the nerves than when proceeding from cold; when it comes on suddenly, and soon after the receipt of an injury, and rapidly increases in severity, than when slow in its progress; when the spasmodic contractions quickly succeed each other, and are excited by very slight causes, than when there is a considerable interval. Survival beyond the fourth day is a favourable circumstance.

Treatment.—I. Of traumatic tetanus. II. Of idiopathic tetanus. In *traumatic tetanus* the nerve supplying the injured part should be divided as early as possible in the disease. The rest of the treatment is that of idiopathic tetanus.

In *idiopathic tetanus*, the treatment which is most justified by experience is that by active purgatives; and of these, turpentine is the best—an ounce of the spirits of turpentine with an equal quantity of castor oil, and if this should not act freely, one or two drops of croton oil in addition may be given at short intervals, till the bowels are freely moved. Or, the croton oil, in doses of one, two, or three drops, may be given alone. It has the advantage of being readily introduced into the mouth, and of being swallowed gradually, without unnecessary effort. If the mouth continue firmly closed, other purgatives and medicines given by the mouth should be introduced by means of a flexible tube passed through the nostrils, or behind the last molar tooth. Clysters have also been recommended, and may be administered in those cases where the bowels do not readily respond to purgative medicines taken by the mouth.

If there is tenderness in the spine, a blister may be applied to the whole length of it, or a bladder of ice.

The rest of the treatment will consist in giving wine and nourishment at short intervals, and keeping the patient as quiet as possible.

Remedies.—Narcotics and sedatives, such as opium, morphia, hydrocyanic acid, digitalis, stramonium, tobacco, belladonna, hyoscyamus, conium, musk, camphor; all of which have been given in enormous doses, with very doubtful advantage. The Indian hemp, recently introduced to the notice of the profession by Dr. O'Shaughnessy, is the best of this class. It is given in doses of two or three grains, every second or third hour. In ten out of twelve cases of *traumatic* tetanus, treated by himself or others, a cure was effected. (See Brit. and For. Med. Rev., July 1840, p. 225.) The vapour of ether or of chloroform.

Mercury has been administered in large doses, so as to produce salivation, but it has only served to increase the sufferings of the patient.

Depressants, such as bleeding, tartar-emetic, tobacco enemata, and the warm and vapour baths. Tonics, such as quinine, carbonate of iron, and sulphate of zinc; and stimulants, such as wine, brandy, and ammonia.

The cold affusion, a remedy which must be used with great caution. The best mode of applying cold is to place the patient in a warm bath, or to wrap him in hot blankets, and then to pour cold water on the head, at first from a moderate height, and in a stream, and if the patient bears this well, from a greater height and in a fuller stream. The sudden shock has more than once proved fatal. The hand should be kept on the pulse during the operation, and its effect on the circulation should be carefully noted.

TETANUS NEONATORUM—INFANTILE TETANUS.

Synonym.—Trismus nascentium.

Symptoms.—In the second or third week after birth, tetanic spasm, beginning in the muscles of the jaw, and thence, in some cases, extending to the whole body, and proving rapidly fatal.

Causes.—Improper diet, as in the Westmann Islands, off the coast of Greenland, where the food of children consists almost exclusively of fish; intestinal irritation in hot climates; the impure air of crowded foundling and lying-in hospitals. Intense cold.

Treatment.—An aperient should be promptly administered, and the child should be placed in a warm bath. The diet should be restricted either to the mother's milk, or to the milk of the cow. A drachm of castor oil is a convenient aperient. Free ventilation is an essential part of the treatment.

HYDROPHOBIA—CANINE MADNESS.

Symptoms.—At an uncertain time, ranging from three or four weeks to eighteen months after a bite from a mad animal, pain or uneasiness, or some unusual sensation, often accompanied by inflammation, is felt in the seat of the wound, followed, in many cases, by pains darting from it along the course of the nerves. These local symptoms are not constantly present. After a few hours or days, wandering pains are felt in different parts of the body, the patient complains of stiffness of the neck and throat, and is restless, irritable, and drowsy, his spirits are depressed, and he is observed to sigh frequently and deeply; his sleep is disturbed with frightful dreams.

The true nature of the case is first revealed by an unusual difficulty in swallowing liquids, which becomes more and more strongly marked till it rises to such a pitch, that the moment any fluid is brought near the patient, or when the noise of the fluid is heard pouring out of any vessel, it occasions him to start with great dread and horror, and the attempt at deglutition is hurried, accompanied with sobbing or deep catching sighs, and followed by convulsions.

There is a degree of irritability beyond description; the countenance expresses intense anxiety, alarm, and suspicion; the eyebrows are contracted, the eyes wild, staring, and glassy; there is intolerance of light and sound, urgent thirst, a parched tongue, a hot and dry skin, and painful efforts to vomit. The sufferer often screams violently, talks in a loud, important, and authoritative tone, and spits out the viscid saliva between his closed teeth, with loud and noisy strainings, not unlike the barking of a dog. In spite of these severe sufferings, the mind often remains unaffected to the last, but in other cases the patient lapses into wild delirium, talks incessantly and incoherently, and is in a state of the most distressing restlessness; the slightest motion, or sudden change of position, a breath of air, a ray of light, a polished surface, or the slightest noise, will excite a sensation of suffocation and convulsions; delirium in some instances takes place, convulsions now become frequent, and the patient dies convulsed, exhausted, or asphyxiated.

DURATION.—Generally from two to three days. In one case, thirty-six hours; in rare instances, eight or nine days.

LATENT PERIOD.—From three or four weeks to some months, or even years. The most common period from twenty to forty days.

PROGNOSIS.—Fatal. The disease has hitherto defied all remedies.

ANATOMICAL CHARACTERS.—Not constant. Slight traces of inflammation in the spinal marrow and its membranes. Inflammation of the fauces and air-passages, with increased secretion.

RATIONALE.—Intense excitability of the nervous system, with local inflammation of the fauces acting upon the spinal marrow through the incident nerves, and giving rise to reflex convulsions.

TREATMENT.—*Indications.* I. To prevent the absorption of the poison. II. To remove the irritation of the throat. III. To diminish the excitability of the nervous system.

I. The first indication is fulfilled by the prompt excision of the wound, which should be allowed to bleed freely, and the subsequent application of caustic. If this cannot be done at once, a ligature should in the meantime be applied above the wound, if it be on an extremity, and the virus should be withdrawn by suction.

II. The second indication has never been effectually fulfilled in any other way than by the use of ice taken internally.

III. The third indication may be fulfilled by powerful doses of narcotic remedies. Experience, however, proves that even the largest doses have little or no effect in controlling the patient's sufferings. Is not the application of cold to the spine and head the best remedy? or in case the peculiar local affection have passed away, and the dread of liquids with it, the cautious and judicious application of the *douche* with the precautions recommended in the cure of tetanus? (See Tetanus.)

The plan here suggested is on the authority of a very remarkable case admitted into King's College Hospital, under Dr. Todd. The patient, a boy of seven years of age, labouring under hydrophobia in its most marked form, and refusing, with characteristic horror and impatience, everything previously offered him, whether in a liquid or solid form—and who had taken ten drops of hydrocyanic acid, repeated at short intervals, and at length twenty drops at one dose, without apparent effect—after the most severe convulsive paroxysm which had yet seized him, was offered a fragment of rough ice. This he swallowed with avidity. Fresh pieces were constantly put into his mouth, which he seized and crunched between his teeth with remarkable eagerness, swallowing them with the greatest ease. In less than half an hour, he had taken, by a rude estimate, no less than a pound and a-half of rough ice. At the same time that the ice was given internally, a bladder containing a mixture of roughly-powdered ice and common salt was applied to the whole length of the spine and around the throat. Under the external and internal application of cold, all the symptoms of hydrophobia, referable to the throat and chest, with the exception of occasional hawkings, had passed away; the viscid mucus no longer flowed from the mouth, the mucus râle disappeared from the chest, and nothing remained but extreme restlessness, violent excitement, and incoherence. The patient sat up in bed with a large fragment of rough ice in each hand, talking incessantly in a loud voice, addressing a thousand incoherent questions to his mother regarding members of his family, and showing an aimless eagerness. The intense excitement continuing, and all the peculiar symptoms of hydrophobia having subsided, the cold *douche* was, in Dr. Todd's absence, applied by my directions, but the system did not rally from the shock. (See Lancet, January 22, 1842, for a longer report of the case.)

I am inclined to attribute more benefit to the internal than to the external use of ice in this case, but the joint administration seems to be the most rational treatment yet recommended. (G.)

If it be thought advisable to use any narcotic at the same time with the ice, the Indian hemp, recommended by Dr. O'Shaughnessy (see Tetanus), appears to be the best. The vapour of ether or chloroform are also worthy of a trial. Stimulants, and external warmth to other parts of the body, should be combined with the local application of cold.

DISORDERS OF THE MIND.

MANIA	Furious Madness.
MELANCHOLIA . . .	Melancholy.
HYPOCHONDRIASIS . .	Vapours—Low Spirits.
DELIRIUM TREMENS. .	Drunkard's Delirium.

MANIA—FURIOUS MADNESS.

SYMPTOMS.—This disease sometimes comes on suddenly, but more frequently slowly and almost imperceptibly, being preceded by a period of *incubation*, of variable length, extending from some days or weeks to as many months or years. The symptoms of this period of incubation are an alteration in the thoughts, habits, tastes, temper, and affections, the patient becoming more and more the reverse of his former self. The general health suffers at the same time, the appetite fails, the sleep is disturbed, the bowels are confined, or irregular, or affected with diarrhœa; the tongue is furred, the pulse frequent and quick; the patient grows thin, and the features alter. There is often pain in the head, a distressing confusion of ideas, a failing of the memory, extreme irritability of temper, and a miserable consciousness of loss of mental power and change of character. Frequently before the disease shows itself in its marked form, the bodily health improves, and the painful consciousness of unsoundness of mind disappears.

After these symptoms of the period of incubation have lasted for a longer or shorter period, without forcibly attracting attention, some unusual excitement, or some circumstance in itself unimportant, brings on a decided attack of mania.

The symptoms of mania, whether beginning suddenly in consequence of strong excitement, or of bodily disease, or coming on slowly after a long period of incubation, are the following:—anxiety, uneasiness, restlessness, sleeplessness, alternate excitement and depression, or continued agitation and violent muscular efforts, rapid incoherent discourse, fits of loud laughter, or loud shoutings, grinding of the teeth, spectral illusions, mental delusions, and unfounded antipathy to certain persons, particularly to near relations or intimate friends. There is a peculiar wildness and fierceness of the countenance, the pupil is dilated, the eyelids widely open, the eyes glistening and unsteady, the features strongly marked, and the countenance flushed. The patient will sometimes complain of severe pains in the head, giddiness, loud noises in the ears, and bright spots before the eyes. The sensations are generally more obtuse than usual, or they are disregarded, so that the patient will bear the most intense cold or heat, prolonged abstinence from food or drink, and long-continued want of sleep. The bowels are usually costive, and require strong aperients, the tastes often depraved, the appetite variable, the habits filthy; the tongue is dry and furred, the pulse increased in frequency, quick, and often full, and the skin often emits a peculiarly offensive odour. The disease is sometimes complicated with epileptic fits, or with symptoms of paralysis, or with disease of the brain.

Some maniacs have lucid intervals, which recur with regularity; others are subject to paroxysms of very irregular recurrence. They are also capable, under certain circumstances, of considerable self-restraint, and of concealing their delusions or designs, and they will carry out their plans with the cunning of rogues, and the contrivance of sane men.

CAUSES.—Hereditary predisposition; violent and stimulating emotions of the mind; uncurbed and immoderate indulgence of the passions;

violent exercise; frequent intoxication; excessive study; suppression of periodical and other evacuations; long-continued discharges; parturition or lactation; certain diseases of the brain, preceding attacks of epilepsy, fever, &c.

DIAGNOSIS.—From *phrenitis*, by the latter being accompanied with fever, the former not. From *delirium tremens*, by the history of the case, the absence of trembling, the more violent excitement, the more complete incoherence.

PROGNOSIS.—*Favourable.* The mania arising in consequence of some other disease or from some temporary cause, as occasional excitement of the mind or a single indulgence in spirituous liquors; the attacks being slight, and not frequent in their recurrence; youth; hæmorrhage; diarrhœa; scabby eruptions; restored hæmorrhoidal or menstrual discharge.

Unfavourable.—Coming on after the middle period of life, or having been of long continuance; complication with epileptic fits, or with symptoms of paralysis.

TREATMENT.—During the period of *incubation*, the *medical* treatment must be determined entirely by the condition of the bodily functions. If there are symptoms of determination of blood to the head, they must be met by remedies suitable to that state; if the bowels are habitually confined, aperients must be regularly administered; if the secretions are disordered, the patient must be put under a course of alteratives; if there is great debility, tonic remedies are indicated; and if the habits of the patient are in any respect unfavourable to health, a change must be insisted upon. The habitual use of the shower-bath, change of air, a nutritious and unstimulating diet, and regular hours for meals and rest, should be particularly enforced. The *moral* treatment will consist in removing as much as possible all causes of excitement, all unnecessary opposition to the patient's plans and wishes, great forbearance on the part of relations and attendants, an entire or partial abstinence from business, change of scene, and cheerful society.

Treatment of the disease when fully formed.—The treatment of this, as of all mental disorders, must be partly *medical* and partly *moral*. *The medical treatment* must be regulated by the existing state of the patient's body, and the ascertained cause of the disease. If the patient is plethoric, or there are decided symptoms of determination of blood to the head, bleeding, cupping, leeching, cold to the head, brisk purgatives, and low diet must be prescribed. If the disease has supervened on suppressed discharges, the same treatment will be necessary. If, however, it has followed suppressed menstrual discharge, and anæmia is present, full doses of steel will be required. If it comes on in the course of another disease, and is in the nature of metastasis, an attempt must be made to re-establish that disease, or active counter-irritation, in imitation of it, must be employed. If, on the contrary, the face is pale, or the attack of mania has been preceded by loss of blood, debilitating discharges, or exhausting diseases, tonics or stimulants, according to the degree of the debility, must be resorted to. In all cases allied to hysteria, the shock of the cold affusion, or the shower-bath, is highly advantageous.

The remedies which have been most recommended in the treatment of mania are bleeding, general and local, purgatives, and the warm and cold baths. Depletion must be used with the precautions just pointed out; purgatives may always be given in the absence of diarrhœa: the warm bath when the skin is cold and the circulation languid; and cold, in its several modes of application, either to reduce inflammation, or, in the form of shock, to rouse the patient to salutary efforts of attention. When there are symptoms of determination of blood to the head, the ice-cap, while the patient is immersed in the warm bath is highly advantageous. The rotatory swing is another remedy which has been used with advantage in maniacal paroxysms.

When the patient is extremely violent and sleepless, opium, as lately recommended by Dr. Oliver, may be given with advantage in very large doses. We may begin with five grains, and increase the dose till it reaches ten, fifteen, or even twenty grains; and as much as half a drachm may be given in the course of the day, and continued for days, or even weeks. This treatment seems to be peculiarly applicable to cases brought on by exhaustion, whether from loss of blood, starvation, intemperance, or dissipation. (See Medical Times and Gazette, August, 1853.)

The moral treatment.—In recent cases of mania, occurring in private houses or in hospitals, it is necessary to prevent the patient from offering violence to himself or others by the strait waistcoat, or the coercion of powerful attendants. In chronic cases, and in lunatic asylums, personal restraint can often be foregone, and constant watchfulness, gentle and conciliating treatment, and occasional seclusion, may be substituted. Much depends upon gaining the confidence of the maniac, and keeping out of sight all irritating means of restraint.

The patient should be engaged in some exercise or pursuit that will employ at once the body and the mind, and thus divert the latter from pursuing one invariable train of thought. He should, therefore, be removed from those objects with which he was formerly acquainted, and out of reach of things and persons associated with the origin of his disease. In cases where there is a tendency to suicide, the most constant watchfulness is required.

Mania is but one of many disorders of the mind, but it is the one which the general practitioner is most likely to be called upon to treat. The other forms of mental unsoundness, viz., idiocy, imbecility, and dementia, fall under the care of those who devote themselves especially to the treatment of the insane.

Idiotism consists in a defective development of some parts of the brain, either at birth or before the full evolution of the understanding.

In these cases the whole of the functions are defective, the general sensibility is but partially established, the limbs are emaciated, or often paralyzed or ill-formed, and the power of articulation is so defective that the individual rather howls than speaks. There is no perceptible alteration of digestion, circulation, or respiration. Imbecility is but a form of this, with a higher degree of intelligence.

Cretinism is a variety of idiotism endemic in parts of Switzerland, and generally found in combination with goître.

Dementia is a diminution of the powers of the mind, with weakness or loss of memory, incoherence of ideas and actions, which have no determinate object. This disease most commonly occurs to persons advanced in life, and is not accompanied by fever or any disturbance of the organic functions. It is caused by some affection of the brain, as chronic arachnitis, and is generally incurable. In many cases it follows an attack of acute mania; in others, it is produced by a sudden and violent mental shock.

MELANCHOLIA—MELANCHOLY.

SYMPTOMS.—This, in its well-marked form, is one kind of monomania. It is characterized by dejection of spirits, fondness for solitude, timidity, fickleness of temper, and great watchfulness. In one form of the disease the patient refers some bodily sensation to some imaginary and impossible cause, as living animals, or even persons, in the stomach or bowels. To this and to the less severe forms of this disorder the term hypochondriasis is often given. The mind pursues one certain object or train of thinking, which in general bears a near relation to the melancholic himself, or to his own affairs, creating the most groundless yet anxious fear, and generally accompanied with a desire of terminating his existence; it is often accompanied by disorder of the digestive organs, with flatulence and costiveness.

CAUSES.—*Predisposing.* An hereditary tendency to insanity; the melancholic temperament in an exquisite degree.

Exciting.—Long-continued disease of the liver and organs of digestion; suppressed evacuations or cutaneous eruptions; distress of mind; sudden mental shocks; anxiety; excessive evacuations; intemperance in the use of spirituous liquors.

PROGNOSIS.—*Favourable.* The absence of hereditary predisposition to insanity; the previous short duration of the disease; the reappearance of habitual evacuations, or diseases of the skin; sound sleep.

Unfavourable.—The disease being the effect of hereditary predisposition, or of the melancholic temperament exquisitely formed; its being of long standing, or supervening on epilepsy or palsy.

Treatment.—The *medical* treatment consists in regulating the functions of the stomach and bowels by aperients and alteratives; in the use of remedies adapted to the existing state of the patient's constitution; and of moderate exercise, the shower-bath, fresh air, &c.

The *moral* treatment consists in changing the scene, amusing the mind, and diverting the attention as much as possible from the existing train of thought; travelling, rural sports, society, conversation on favourite topics, and music, may be recommended, according to the tastes of the patient, his previous habits of life, and the experience of his friends or attendants. Patients who betray the slightest tendency to suicide must be closely and constantly watched. When the patient supposes the stomach or bowels to be the seat of some living animal, a pretended operation for its extraction will often effect a cure.

HYPOCHONDRIASIS—VAPOURS—LOW SPIRITS.

Symptoms.—Dyspepsia, with dull pain in the hypochondria; languor, listlessness, want of resolution and activity, disposition to seriousness, sadness, and timidity as to future events; an apprehension of the worst and most unhappy state of them, and therefore, upon slight grounds, a dread of great evil; particular attention to health, and, upon any unusual feeling, a fear of imminent danger, and even of death itself.

Causes.—*Predisposing.* The melancholic temperament.

Exciting.—All the causes of dyspepsia; painful impressions upon the mind; distressing events.

Diagnosis.—From *melancholia*, in degree, and in the more constant coincidence of dyspeptic symptoms. From *dyspepsia*, by the affection of the mind being greater, that of the stomach less, than in idiopathic dyspepsia.

Prognosis.—*Unfavourable.* The melancholic temperament exquisitely formed; complication with other diseases; the previous long continuance of the disease.

Treatment.—That of dyspepsia and melancholia combined (see those diseases). The patient will expect to be attended to in all his complaints; he must accordingly be humoured and indulged, and will generally experience satisfaction from taking medicine. Change of air and scene, where they can conveniently be had, should be prescribed.

DELIRIUM TREMENS—DRUNKARD'S DELIRIUM.

SYMPTOMS.—Sleeplessness; restlessness; delirium, during which the patient recognises those about him, answers questions rationally, and does hurriedly what he is told to do; trembling of the lips, hands, and muscles is generally present, and more particularly in speaking, or on making any effort. The patient talks incessantly, and evinces a great anxiety to be doing something. He fancies that he is surrounded with enemies, or that he is in a strange place, from which he is constantly endeavouring to escape; or he thinks that some great evil is impending, or has actually befallen him. He is suspicious of those about him, and is tormented with frightful images or sounds; and will often be found busily looking, in unlikely places, after some object or other on which his mind is intent. He is rarely violent, at least in the best-marked cases of the disease; but he sometimes exposes himself to danger in endeavouring to effect his escape. There is profuse perspiration, a moist and slightly-furred tongue, and a frequent pulse. In fatal cases, the delirium is often replaced by coma, the tremor passes into subsultus tendinum, and the evacuations become involuntary. In other cases, the coma is rapidly followed by embarrassed respiration, mucous râle, and death by apnœa. The disease is very apt to recur.

POST-MORTEM APPEARANCES.—Effusion of serum, in the ventricles, at the base of the brain, under the arachnoid, or in all these situations; injected state of the pia mater. Alcohol has been detected in the serum of the ventricles.

RATIONALE.—A loss of tone in the capillary vessels of the brain, leading to the appearances and results of inflammation, and restored only by resuming the same or a similar stimulus to that by which the altered state of the vessels was originally produced.

CAUSES.—*Predisposing.* Habitual indulgence in spirituous liquors, and in opium or in other poisons belonging to the class of narcotics and sedatives. Mental exhaustion from intense study or prolonged anxiety. The male sex? (this point, for obvious reasons, cannot be accurately determined.) The summer season.

Exciting.—An occasional debauch; continued intemperance; sudden abstinence from an accustomed stimulant; loss of blood; all causes of debility; shock, physical or mental; severe wounds (delirium traumaticum). Diseases occasioning, or ending in, great exhaustion.

DIAGNOSIS.—From *meningitis* by the previous history; by the absence of headache; by the ease with which the patient may be roused; by the trembling of the hands; by the absence of febrile symptoms. The distinction between meningitis and a form of delirium tremens coming on after a single debauch, or a comparatively short indulgence in habits of intoxication, is not so easily made, and, in extreme cases, the history of the patient and of the existing attack will be our only guide to treatment. When the respective diseases are well marked, there is no difficulty in the diagnosis.

PROGNOSIS.—*Favourable.* If depletion has not been previously practised to an undue extent, or if the treatment has not been too long delayed.

Unfavourable. In all cases where the patient has been submitted to treatment tending to occasion exhaustion.

TREATMENT.—*Indication.* I. To procure sleep. II. To reduce inflammation in those cases in which inflammatory symptoms are present.

I. This indication is fulfilled by full doses of opium, laudanum, morphia, or other preparations of opium. Two or three grains of solid opium, or from half a drachm to a drachm of laudanum, followed, at intervals of one, two, or three hours, by a grain of opium, or from twenty drops to half a drachm of laudanum, till sleep is procured, is the appropriate treatment; other preparations of opium, in equivalent doses may be substituted. The opium may be combined with ammonia, in doses of from five to ten grains, with wine, or with the accustomed stimulus of the patient.

The following is a good form of medicine:—℞. Ammoniæ sesquicarb. gr. x.; Tinct. Opii ♏ xxx; Mist. Camphoræ ℥ i. This draught may be given every three or four hours, till sleep is procured.

II. Inflammatory symptoms, when they exist, must be treated by the moderate and cautious abstraction of blood, followed by opium, in combination with full doses of tartar-emetic. It is in this class of cases that the combined use of the preparations of opium and antimony is strongly indicated. In the absence of symptoms of inflammation, the appropriate treatment is by opiates and stimulants. Cold to the head and counter-irritants may also be used where symptoms of inflammation exist. The bowels may be kept moderately open, but strong purgatives should be avoided.

The abstraction of blood should on no account be prescribed, unless the countenance is flushed, the eye injected, and the pulse hard and incompressible. Bloodletting is contraindicated in all other cases; and it is very rarely admissible except in that form of the disease which is due to a single debauch.

The patient should be watched, but, if not extremely violent, ought not to be confined by the strait waistcoat. One or two strong persons should be at hand for security's sake.

REMEDIES.—Calomel and opium. The calomel is contraindicated. Opium and tartar-emetic; indicated when inflammatory symptoms are present. Digitalis?

CHAPTER II.

DISEASES OF THE CIRCULATING SYSTEM.

1. Of the Heart.
2. Of the Arteries.
3. Of the Veins.

DISEASES OF THE HEART.

1. Functional or Nervous Affections.
2. Structural or Organic Diseases.

1. FUNCTIONAL OR NERVOUS AFFECTIONS.

Palpitatio	Palpitation.
Syncope	Fainting.
Angina Pectoris	Spasm of the Heart.
Neuralgia of the Heart	Pain in the Heart.

PALPITATIO—PALPITATION.

The term *palpitation*, or *nervous palpitation* of the heart, is given to frequent, strong, and tumultuous movements of the heart, without any appreciable organic lesion. When existing in an extreme degree, the beats of the heart are both felt and heard by the patient, and seen by the bystander. The palpitations are sometimes accompanied by a slight and transient bruit de soufflet, which disappears as soon as the heart becomes quiet. They are also attended by a feeling of sinking and anxiety difficult to describe, which patients refer to the region of the heart or pit of the stomach, and often designate "a sinking at the heart." In some cases there is a tendency to syncope.

Causes.—*Predisposing*. The nervous temperament; the female sex; debility. Persons of a nervous temperament, and those of both sexes who are subject to hysteria, hypochondriasis, melancholy, epilepsy, and general nervous disorders, are very liable to palpitations.

Exciting.—Strong mental emotions, joy, grief, anger, sadness, fear, anxiety, &c.; violent exercise, whether active or passive. Debility caused by chronic diseases, or occurring during the convalescence from fevers or other acute diseases; excessive loss of blood; inordinate natural discharges; abuse of purgatives; spare or unwholesome diet; the abuse of spirituous, vinous, or fermented liquors; want of sleep; long-continued anxiety and distress; close confinement; intense study; dissipation and debauchery; excessive sexual intercourse; onanism.

The diseases most frequently accompanied by palpitation are, anæmia, hysteria, spinal irritation, and mimosis inquieta, in females; seminal weakness in males; plethora, and pulmonary consumption in both sexes.

Chlorotic girls are often supposed to labour under organic diseases of the heart, when there is only functional or nervous disturbance of the organ. They complain of palpitations, difficulty of breathing, and pain in the left side, and are sometimes bled, leeched, cupped, and blistered when they require an opposite treatment.

Persons who suffer from spinal irritation are also very liable to palpitation, and the pulse, in such cases, may exceed 160 in the minute. In these cases there are pains extending from the spine to the abdominal and thoracic organs, to the neck, shoulders, head, and limbs, and, by nervous sympathy, to every part of the body. The respiration is difficult, or easily rendered so, on any slight exertion or mental emotion; and the pressure of the stays on the chest, round the waist, or lower part of the spine, is intolerable. Pressure on the affected part of the spine has suddenly induced pain in the chest, cough, and palpitation. This disease is very common in large towns, in girls and young women, from the age of fifteen to twenty-five years.

Lastly, nervous palpitations are very common at the cessation of the menstrual function, and in women labouring under diseases of the womb, ovaries, breasts, or any chronic complaint. They may be slight, transient, and intermittent, like all other nervous disorders; and they recur more frequently in proportion as the heart becomes more irritable; but they do not produce any serious alteration of the health, unless they continue for a long time, when they may be followed by hypertrophy of the heart. They are most troublesome after vivid mental emotions and muscular exertion, though they are sometimes most distressing when the body is in a state of repose, as during the first part of the night, when they often prevent sleep for several hours. They are also occasionally accompanied by a sensation of internal agitation or fluttering in the head, chest, or abdomen, and there is often a copious and frequent evacuation of urine, when the patient is hysterical. They are least troublesome when the person is in the open air and taking exercise; a fact attested by most nervous women.

Another cause of palpitation is dyspepsia, and this is a cause also of intermittent pulse. In some patients, flatulence is always followed by palpitation. But one of the most common causes of palpitation, without organic disease of the heart, is tubercular deposit in the lung. Long before any other symptom of pulmonary consumption has made its appearance, the patient will often complain of distressing palpitation; and this is so common, that palpitation, not otherwise readily accounted for, should lead to an examination of the lungs.

DIAGNOSIS.—The condition of the general health, the absence of the physical signs of organic disease; the peculiarly distinct character of the sounds of the heart; the absence of inequality and irregularity of the pulse (except in rare cases of dyspepsia); the entire freedom which is enjoyed at intervals; the great frequency of the pulse when the finger is first placed upon it, and the gradual diminution which follows as the patient's apprehension disappears—such are the ordinary diagnostic marks of simple palpitation of the heart. The diagnosis is, however, not free from difficulty, and may, in some cases, require repeated examination before a decision can be formed. That this difficulty is often experienced, will appear from the observation of Dr. Baillie: "There are, in truth, few phenomena which puzzle, perplex, and lead into error the inexperienced (and sometimes the experienced) practitioner, so much as inordinate action of the heart. He sees, or thinks he sees, some terrible cause for this tumult in the central organ of the circulation, and frames his portentous diagnosis and prognosis accordingly. In the pride of his penetration, he renders miserable for a time the friends, and by his direful countenance damps the spirits of his patient. But ultimate recovery *not seldom* disappoints his fears, and the physician is mortified at his own success."

TREATMENT.—In plethoric individuals, general and local bleeding from the region of the heart, by leeching or cupping; followed by tartarized antimony, digitalis, or hydrocyanic acid; counter-irritation by tartarized antimony or blisters; or an anodyne plaster over the region of the heart, as one of belladonna, opium, hyoscyamus, or conium. Low diet, repose, and quietude of mind and body; a strict attention to the state of the stomach and bowels. In delicate, nervous, and chlorotic persons, tonics, chalybeates, cold or shower baths, change of air, a nourishing diet, improvement of the digestion and general health, with moderate exercise. In such persons bloodletting is injurious, and often productive of the worst consequences.

Palpitation in weak and nervous persons of both sexes is best treated by tonics and sedatives in combination. One of the best formulæ of this kind consists of from ten to twenty drops of dilute sulphuric acid, five drops of laudanum, five or ten drops of tincture of digitalis, with an ounce or an ounce and a half of the infusion of quassia, or other tonic infusion. (See Mimosis Inquieta, p. 233.)

In nervous palpitations from mental emotions, tranquillity of mind is indispensable. It is useful to observe, that nervous palpitations are often aggravated by the fear of organic disease of the heart; hence, if the medical man can succeed in convincing his patient of his error, he will often succeed in effecting a cure.

Irregular and intermittent pulsations of the heart often arise from the causes which produce nervous palpitations, and will be relieved by the same remedies. They may also depend on organic diseases of the heart. It is worthy of notice, that the pulse at the wrist and heart may be irregular and intermittent during health, become regular during acute disease, and return to its former condition during convalescence or recovery. Irregular and intermittent pulse is often traceable to dyspepsia, and to attacks of flatulence.

Pulsation in the epigastrium, like palpitation, is dependent upon various causes, and like it occurs in paroxysms, and in dyspeptic persons. Sometimes the pulsation is communicated to an intestine distended with gas or fæces, and in this case it is apt to simulate aneurism. It is frequently removed by a brisk purgative, or by a course of aperient medicines.

SYNCOPE—FAINTING.

Symptoms.—A person about to be attacked with syncope experiences an indescribable distress, or feeling of faintness; the eyes become dim, and covered with a kind of film; there is a sense of singing or buzzing in the ears, the countenance and lips are pale, the mind fails, the body is covered with a cold perspiration, and the patient, if unsupported, falls to the ground. Sometimes the loss of sense is incomplete, when the patient turns cold and pale, yet the pulse continues to beat, or rather to tremble, and respiration is just perceptible; at others, not the smallest sign of life can be perceived; the face has a death-like paleness, the extremities are cold, the eyes shut, the mouth sometimes shut and sometimes open, the limbs flaccid, and the strength quite gone. Recovery is announced by deep and heavy sighs; and is frequently accompanied with vomiting. It sometimes terminates in epilepsy and convulsions.

Diagnosis.—Syncope does not continue, in general, longer than a few seconds; but in some cases it persists for several minutes. In hysterical syncope, the pulse beats as usual, the countenance is lees pale, and the eyelids vibrate.

Causes.—*Predisposing.* Nervous irritability and delicacy of constitution; debility, however induced; profuse evacuations, especially of blood; organic diseases of the heart or large vessels; plethora.

Exciting.—Strong mental emotions, severe pain, loss of blood.

Treatment.—When syncope is purely nervous, there is seldom any danger. The recumbent position, fresh air, cold water sprinkled on the face and neck, and hartshorn to the nostrils, will soon restore animation. Such articles of dress as impede respiration should be immediately loosened. Hysterical syncope must be treated by cold affusion.

When fainting fits are produced by organic affections of the heart, or neighbouring viscera, the same remedies must be employed during the fit, with the exception of the sprinkling with cold water; and we must endeavour to prevent its recurrence by medicines calculated to remove or palliate the primary disease.

ANGINA PECTORIS—SPASM OF THE HEART.

SYNONYM.—Syncope anginosa.

DEFINITION.—Sudden and acute pain in the chest, referred to the sternum, accompanied by intense anxiety and fear of death.

SYMPTOMS.—During exercise, especially when walking up an ascent against the wind, or after a full meal, a sudden and violent pain across the chest, extending down the arms as far as the insertion of the deltoid muscles, and, in some cases, to the wrists, or fingers, accompanied with a sense of stricture, so acute as to threaten immediate destruction. The patient is instantly obliged to stand still, and the moment he does so all the symptoms vanish. After repeated attacks of the disease, it is excited by slighter causes, and the paroxysms are more violent and of longer duration. It often occurs on the patient's waking from his first sleep, and he is, at times, incapable of lying down. At length, a fit more violent than usual puts an end to his existence.

CAUSES.—*Predisposing.* The male sex; advanced age. The great majority of cases occur in men after fifty years of age, but it may occur as early as thirty-five.

Exciting.—All causes which excite the circulation, such as violent exercise, strong mental emotion, and excesses of all kinds. It is often connected with flatulence, which forms a very troublesome accompaniment.

Proximate.—Organic disease of the heart and large vessels, viz.: ossification of the coronary arteries; ossification of the valves of the heart; morbid accumulation of fat; atrophy of the heart with softening of the muscular structure from fatty degeneration of the organ. In a few cases the disease is quite unexplained by any morbid appearance.

TREATMENT.—*Indications.* I. In the paroxysm, to alleviate the distressing symptoms above described. II. In the interval, to prevent the return of the disease.

I. The symptoms are sometimes relieved—

1. By bleeding. This remedy, however, ought to be used with great caution, and only when the pulse, during the fit, is full and hard. The patient should be placed in the recumbent position, and a small

quantity only of blood be drawn away. The treatment during the paroxysm must, however, depend upon the cause of the disease. When there is disease of the valves of the heart, the cautious abstraction of blood will often be indicated, and give great relief. If there is reason to apprehend atrophy of the heart, or softening of the muscular structure, bleeding is contraindicated, and the stimulant plan is to be preferred.

2. By cordials, stimulants, and antispasmodics, such as æther, laudanum, ammonia, brandy and water, and strong coffee. The patient should always have at hand some diffusible stimulus, or combination of a diffusible stimulus with an opiate, such as experience has shown to be beneficial. (℞. Spt. æther. sulphur. C. f ℥iss. Liq. opii. sedativ. f ʒss. A small tea-spoonful, in a wine-glass of water, to be taken on each occurrence of a fit.)

II. The return of the paroxysm is to be prevented.

1. By abstemious living.

2. By avoiding strong exercise, and walking up hill, especially against the wind. Violent emotions of mind are also to be carefully guarded against.

3. By remedies adapted to the existing state of the general health and existing local affections.

REMEDIES.—Issues; setons; blisters to the chest; belladonna plasters to the side.

NEURALGIA OF THE HEART.

SYMPTOMS.—This disease differs from angina pectoris in consisting of a darting pain in the region of the heart, without any affection of the respiration; and, in most cases, without any alteration in the heart's beat. It is purely nervous, and probably dependent upon dyspepsia, combined with flatulence. It has been attributed in some cases, and with apparent reason, to the excessive indulgence in strong tea.

DIAGNOSIS.—From *organic diseases of the heart* by the absence of the stethoscopic signs of those diseases. From *angina pectoris*, by the little disturbance of the circulation, by the pain not being accompanied by the peculiar suffering of angina, and by the absence of the pain in the arms.

TREATMENT.—This must be regulated by the general state of the patient's health, and by the ascertained cause of the individual paroxysms. Benefit is often derived from the application of a belladonna plaster to the region of the heart. It is probable that certain cases of nervous asthma, and the less severe forms of angina pectoris are simply neuralgic affections; and these are generally relieved by powerful sedatives and antispasmodics, as in cases of nervous palpitations.

Spasm of the Heart is described by Laennec, though considered an imaginary disorder by Bouillaud, who states that there is no positive fact to attest its existence. But there is no reason why the heart should not suffer from spasm as well as other muscular organs.

The muscular structure of the heart would also seem to be the occasional seat of rheumatism; the symptoms being constant dull pain, increased at intervals, and palpitation, without any abnormal sound. In such cases, colchicum is indicated.

STRUCTURAL DISEASES OF THE HEART.

PERICARDITIS . .	Inflammation of the Pericardium.
ENDOCARDITIS . .	Inflammation of the Endocardium.
DISEASES OF THE VALVES OF THE HEART.	
CARDITIS	Inflammation of the Substance of the Heart.
HYPERTROPHY . .	Of the Heart.
ATROPHY	Of the Heart.
DILATATION . . .	Of the Heart.
CYANOSIS	Blue Disease.

PERICARDITIS—INFLAMMATION OF THE PERICARDIUM.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE PERICARDITIS.

Idiopathic pericarditis is of very rare occurrence. The disease is commonly an accompaniment of acute rheumatism.

SYMPTOMS.—After rigors, which are sometimes extremely severe, pain, more or less acute, under the left nipple and towards the inferior extremity of the sternum, occupying a part or the whole of the præcordial region, radiating towards the left axilla and arm, and sometimes extending down the left arm to the elbow or wrist. The pain may be pungent and lancinating, or dull and obscure. Some patients, indeed, do not complain of any pain, but merely of a feeling of oppression. When pain is present, it is increased, when absent, often produced, by deep pressure in the intercostal spaces over the region of the heart, by upward pressure against the diaphragm, or by an attempt to lie on either side.

There are violent and often irregular palpitations distinguishable on placing the hand over the heart, and sometimes on inspection, while in other cases the hand does not detect them.

In addition to these symptoms, referable to the heart itself, there is more or less fever; a frequent, full, hard, regular and *jarring* pulse, or a small, unequal, irregular, and very rapid one; dyspnœa, an insupportable sense of oppression, restlessness, jactitation, and an urgent want of fresh air; the skin is often bathed in sweat, or it is very dry and hot; the countenance is pale, sharpened, and marked with the greatest anxiety, and an expression of undefinable terror. Sometimes there are attacks of partial or general convulsions, the respiration is interrupted by sighs, sobs, and hiccups; there is in some cases a slight and momentary delirium, and if the patient sleep, he awakes with fearful dreams; in other cases, there is complete insomnolence. The anxiety and agony are sometimes so great and insupportable that the slightest motion occasions an apprehension of sudden death. When the disease proves fatal, all the symptoms increase in severity, the breathing becomes more and more laborious, the countenance is livid, the eye glassy, the skin covered with a clammy sweat, and the patient expires amidst dreadful sufferings.

Rheumatismal pericarditis is often indolent and attended with little pain, if pleurisy does not exist at the same time. In this last complication there is pain, more especially when the left pleura is affected; and this is never so severe and pungent as when the pleurisy is situated in the left portion of the diaphragmatic pleura.

TERMINATIONS.—1. In complete recovery. 2. In chronic pericarditis. 3. In death.

ANATOMICAL CHARACTERS.—Effusion of serum, mixed with shreds of coagulable lymph, or with pus, and sometimes tinged with blood; rough deposits of lymph on the surface of the membrane; slight and soft adhesions between the two surfaces. Within the heart, some of the appearances proper to acute endocarditis.

DIAGNOSIS.—Difficult in certain cases, and apt to be confounded with pleuritis, pneumonia, or even simple fever. When the symptoms above described are strongly marked, it is difficult to confound it with any other disease. In any case, the *physical* signs will assist materially in the diagnosis.

Percussion gives little or no assistance in acute and recent cases, unless there is extensive effusion.

Auscultation.—Within a few hours or one or two days of the commencement of the disease, a superficial *to-and-fro* sound (*bruit de frottement*), corresponding to the two sounds of the heart, and resembling the sound caused by rubbing the two hands backwards and forwards against each other, or when the secretion of lymph is of a more consistent character, closely resembling the sound of new leather (*bruit de cuir*), or in still more marked cases, the sound of a file or rasp (*bruit de scie, bruit de râpe*). As the secretion into the sac of the pericardium increases, or if the opposite surfaces become adherent, the *to-and-fro* sound disappears. This superficial *to-and-fro* sound is often accompanied by a bellows sound synchronous with the systole of the heart, and this sound often remains when the *to-and-fro* sound has ceased. The *to-and-fro* sound is first heard a little to the left of the mesial line, and about the centre of the sternum, whence it gradually extends to the entire surface of the heart.

PROGNOSIS.—Complete recovery is very rare, if it ever occur. Some roughness of the pericardium, or adhesion of the opposed surfaces, or effusion into the sac of the pericardium, is left behind, or some of the diseased states induced by the accompanying endocarditis. (See Chronic Pericarditis, Endocarditis, and Hydropericardium.)

CAUSES.—*Predisposing.* Hereditary tendency to rheumatic and gouty affections; male sex; age from 10 to 30.

Exciting.—Cold, and, in the large majority of cases, the extension or metastasis of acute articular rheumatism.

TREATMENT.—*Indications.* I. To subdue the existing inflammation. II. To promote the absorption of effused matters.

I. The first indication is fulfilled by general or local bleeding, according to the strength and state of the patient. If the disease comes on suddenly in a vigorous plethoric person, blood may be taken from the arm, to the extent of making a decided impression on the pulse; and this may be followed by cupping or leeches over the region of the heart. But if the disease supervenes, as it generally does, in the course of an attack of acute rheumatism, or in one whose health is already below par, topical bleeding by cupping or leeches will suffice. In no case should depleting measures be carried to excess. This part of the treatment may be assisted by purgatives, rest, and the antiphlogistic regimen; and when depletion has been carried to the proper extent, a blister may be applied over the region of the heart, and kept open for a time by the savin ointment.

II. The second indication is fulfilled by mercury freely given every one, two, or three hours, in combination with opium, and accompanied by mercurial inunctions, till the gums are sore. In very acute forms of idiopathic pericarditis, the mercury may be combined with tartar-emetic in doses of from $\frac{1}{6}$ to $\frac{1}{4}$ of a grain; and in rheumatic pericarditis, with the extract of colchicum, in doses of one, two, or three grains.

2. CHRONIC PERICARDITIS.

SYMPTOMS.—Palpitation and dyspnœa, accompanied sometimes with dry cough; inability to lie on the left side; slight pain or uneasiness in the region of the heart; low fever, with or without evening exacerbation; sense of oppression; great debility; and slow and imperfect convalescence, or a fatal termination in hydropericardium.

CAUSES.—Chronic pericarditis is generally a sequela of the acute form of the disease; but in debilitated constitutions, or when it comes on in the course of an attack of acute rheumatism, the symptoms are from the first much less severe, and sometimes very obscure.

TREATMENT.—Local depletion by cupping and leeches; blisters to the region of the heart; calomel and opium; or, where the disease is the consequence of rheumatism, colchicum, combined, if there is much debility, with ammonia. The convalescence should be carefully watched, violent exercise should be avoided, and a nourishing, unstimulating diet should be prescribed.

SEQUELÆ.—Important structural changes often remain when the symptoms of pericarditis, whether acute or chronic, have been removed. The pericardium may be thickened, and the subjacent capillary vessels may become enlarged. There may be serum, or lymph, or pus in the pericardium, adhesions, partial or general, and organized deposits of fibrin, in the form of granulations and vegetations. The false membranes may also become fibro-cartilaginous, or osseous, and cover the heart as with an osseous shell.

The effused fluid, or the thick false membranes sometimes compress the heart so as to occasion atrophy.

The internal sero-fibrous tissue of the heart sometimes presents the same alterations as the external covering.

The muscular tissue of the heart may, like the serous, fibrous, and cellular tissue of the same organ, become thickened and hypertrophied, indurated or softened, by the extension of the inflammation from the pericardium. (See Carditis.)

These changes—the effusion of coagulable lymph on the surface of the pericardium, the more dense formations just described, the adhesion of the surfaces of the pericardium, and the effusions into its sac, —may be detected by careful stethoscopic examination. The superficial *to-and-fro* sound synchronous with both sounds of the heart, already described (see Acute Pericarditis), is generally characteristic of recent effusion, and disappears as the sac of the pleura becomes distended, or when adhesions are formed. The denser deposits on the surface of the pericardium are indicated by harsher and louder sounds, corresponding to the apex or base of the heart. Partial adhesions of the two layers of the pericardium are sometimes productive of no unusual sounds; at others, of some modification of the friction sounds. Extensive adhesions of the two layers of the pericardium generally lead to irregular action of the organ, and are accompanied by a well-marked retraction of the epigastrium, and hollowing of the intercostal spaces with each systole of the heart. When the heart is thus obstructed in its movements, the beat continues to be perceptible in the same spot, in all positions of the body, and in all states of the respiration. For the physical signs of extensive effusion in the sac of the pericardium, see Hydropericardium.

ENDOCARDITIS—INFLAMMATION OF THE ENDOCARDIUM.

Symptoms.—General feeling of uneasiness, anxiety, and oppression at the præcordia, with a tendency to syncope. No pain, unless the disease is complicated with pericarditis or pleuritis. In the more severe cases there is well-marked fever, hot and dry skin, thirst, and restlessness. There is violent and irregular action of the heart, with a *small*, feeble, and often intermitting pulse; extreme anxiety; jactitation; cold sweats; pale and shrunken features, expressive of extreme alarm; dyspnœa, faintness, or actual syncope; lividity of the lips and cheeks, slight swelling of the hands and feet, and short convulsive or epileptic seizures.

Anatomical Characters.—1. Redness of the internal membrane or endocardium, sometimes extending to the entire surface, but more generally partial, often confined to the valves alone, and generally accompanied by some thickening, infiltration, and softening of the membrane.

2. Effusion of coagulable lymph, in the form of white, elastic, glutinous masses, adherent to the parietes of the heart, and entwined round the valvular tendons and fleshy columns, and often prolonged into the large vessels. They are generally adherent to the free borders of the valves, on which traces of them are found after repeated ablutions.

3. Vegetations or granulations generally situated on the free borders of the valves, and sometimes on the internal surface of the cavities, and especially of the auricles. They vary in size from that of a millet-seed to that of a grain of hemp-seed, or of a small pea; they present different shapes, according as they are single or in clusters. Sometimes they are round, at others cylindrical or flattened, and their surfaces may be smooth, or rough, and when they are clustered together, they often resemble the head of a cauliflower.

4. These vegetations are often accompanied by fibro-cartilaginous or calcareous indurations of the valves, and when large or numerous, they prevent the action of the valves, and more or less contract the orifices, so as to impede the circulation of the blood through the affected side of the heart, and so lay the foundations of other severe diseases of the organ. The opposite borders of the valves may adhere to each other.

Causes.—Those of pericarditis, with which it is often closely connected.

Diagnosis.—The stethoscopic indications mentioned under diseases of the valves of the heart.

Prognosis.—The disease is rarely fatal in its acute stage; but it generally leaves behind it valvular disease, which lays the foundation of hypertrophy, and increasing impediment to the circulation, ending either in sudden death or in dropsical effusions. The duration of the disease is very various, and much influenced by the habits of the patient. It may continue for years, leading to a slowly increasing embarrassment of the circulation.

Treatment.—That of pericarditis. In the acute form, and in vigorous subjects, active and prompt treatment is still more necessary than in pericarditis.

When endocarditis becomes chronic without organic disease, the symptoms may be alleviated by small and repeated bleedings, cupping, or leeching; gentle aperients; counter-irritants; the warm bath; repose; and a strictly regulated diet. Issues and setons over the region of the heart may also be used with advantage.

For further observations on the treatment of the diseases induced by, or complicated with endocarditis, see the diseases themselves.

DISEASES OF THE VALVES OF THE HEART.

Symptoms.—The symptoms attendant on diseases of the valves of the heart are by no means uniform; but they vary with the particular valve which is the seat of the disease, and the nature, extent, and duration of the morbid change itself. This change, by the impediment which it offers to the circulation of the blood, leads to alterations in the size of the cavities, and in the strength of the parietes, of the heart; and the altered condition of the circulation through the heart itself is soon followed by serious changes in the general circulation through the body, by secondary diseases of the important viscera of the chest, head, and abdomen, and by dropsical effusions.

The symptoms of valvular disease, therefore, are partly common to all diseases of the heart, and partly peculiar to itself. The more common symptoms are palpitation, a tumultuous beat of the heart, a frequent pulse, a sense of weight, tightness, and oppression, sometimes accompanied by pain, in the region of the heart and at the epigastrium; dyspnœa, an inability to lie on one or other of the sides, and sometimes on both; flatulency, frequent feelings of faintness and giddiness, or fits of syncope; an anxious expression of countenance, with slight knitting of the brows; the countenance sometimes pale, sometimes suffused; to which, in more advanced stages, are added cough and dropsical effusions. These symptoms are greatly increased by active exertion, walking up hill, or mounting the stairs, and by violent mental emotions, as anger, fear, fright, &c.

The effect which these alterations in the structure of the heart produce upon the more important functions of the body deserves attentive consideration.

Influence on the arterial and venous circulation.—Notwithstanding the irregular, unequal, intermittent, and violent beatings of the heart, the pulse is generally small, and often compressible, but in other cases hard and vibrating, more especially when the left ventricle is hypertrophied and contracted; and it is sometimes accompanied by a vibratory or quivering motion in the arteries near the heart.

When there is contraction of the orifices of the heart, with induration of the valves, there is a greater or less obstacle to the venous circulation. All the external veins, and those near the heart, as the jugulars, for example, are dilated, according to the degree and duration of the disease. These veins become varicose and greatly enlarged, in some cases, on the sides of the neck and above the clavicles; whilst, at the same time, the anastomosing veins on the parietes of the chest and abdomen, which are scarcely perceptible in the normal state, become augmented in size. The jugular veins, in such cases, sometimes pulsate synchronously with the heart and pulse; but this must not be confounded with the expansion of these veins during each expiration, or with their elevation caused by the beatings of the carotids. The venous pulse of the jugulars is the effect of the reflux of a certain quantity of blood into the right auricle and large venous trunks, during the contraction of the right ventricle. This reflux occurs when the indurated tricuspid valve does not close during the systole, and when the right auriculo-ventricular orifice is so dilated that the tricuspid valve, whether normal or not, cannot close hermetically at the moment of the ventricular contraction.

The lividity of the face and lips is caused by an obstacle to the return of the venous blood; and to this are also to be attributed the congestion of the hands, lungs, liver, brain, mucous, cellular, and serous membranes; serous effusions, as ascites, hydrothorax, anasarca, and also the different passive hæmorrhages. Other diseases of the organs now mentioned are often caused by obstruction to the passage of the venous blood through the right cavities of the heart. The same mechanical cause often predisposes to apoplexy and paralysis.

Influence on the respiration.—Slight dyspnœa, or shortness of breath, increased by exertion or mental emotion, is the first derangement of the respiration; but as the disease advances, this symptom often becomes so urgent as to be incorrectly designated by the term asthma. In extreme cases, the patient cannot breathe unless sitting up in bed (orthopnœa), and dreads suffocation on lying down. A cough with mucous expectoration is a frequent concomitant.

Influence on the cerebral functions.—The countenance is expressive of marked anxiety. The patient, though drowsy, sleeps little, and his slumbers are disturbed by frightful dreams, from which he awakes with increased difficulty of breathing, and an aggravation of all his sufferings. In fatal cases, death is often preceded by delirium, and ends in coma.

When one or more of the symptoms just detailed are present, our attention should be directed to the heart, and a careful stethoscopic examination should be made. There are also certain characters of the pulse which are alone sufficient to rouse the attention, such as an unusual frequency, accompanied by a peculiar jarring or thrilling stroke; or any inequality, irregularity, or intermission of the beats.

Physical Signs.—The attention having been directed to the heart as the seat of disease by any of the foregoing symptoms, the precise nature and seat of the disease may often be discovered by the use of the stethoscope. The sounds heard on the application of the instrument are the bellows sound (*bruit de soufflet*), saw sound (*bruit de scie*), and rasp sound (*bruit de râpe*). A cooing sound, and various musical sounds are of less frequent occurrence. These sounds are generally single, accompanying either the systole or diastole of the ventricles, but sometimes they are double, accompanying both sounds. In the more severe and extensive diseases, the sounds are constant; when the valves have undergone less change, the sounds may be heard only during violent exertion, or in certain postures of the body.

DIAGNOSIS OF CONTRACTIONS OF THE DIFFERENT ORIFICES OF THE HEART.

Many difficulties are in the way of an exact diagnosis. The following hints may be useful :—

The left side of the heart is much more frequently affected than the right.

Diseases of the right side chiefly affect the venous circulation, causing regurgitation into the jugular veins, known as the venous pulse; those of the left side affect chiefly the arterial pulse, giving rise to irregularity and inequality.

The sounds produced by disease of the semilunar valves of the aorta are distinctly heard, not only over the site of the valves themselves, but also in the course of the artery, whilst they diminish in intensity from the base to the apex of the heart, where they become inaudible. On the other hand, the sounds produced by diseases of the auriculo-ventricular valves are heard most distinctly about an inch above the apex of the heart, and become less distinct in the track of the large vessels. The sounds have a louder and sharper tone in disease of the aortic than in that of the auricular valves.

In each valve there are two causes of abnormal sound—the direct flow of blood and the regurgitation; the first is synchronous with the systole of the ventricles and with the pulse; the second, with the diastole of the ventricles.

The following are the distinctions laid down by the best authorities :—

Aortic valves.—Murmur loudest at the middle of the sternum, but distinct in the course of the large arteries; accompanying the pulse, if it depend upon the onward current, but following it if caused by regurgitation; the sound superficial, and of a peculiar whizzing character; the pulse *thrilling*, but often full and regular. There is sometimes a double sound, in which case the diseased valves offer an impediment to the entrance of blood into the artery, while their imperfect closure permits of reflux. The first sound, therefore, accompanies the systole, and the second, the diastole of the left ventricle.

Mitral valves.—Murmur loudest opposite the left margin of the sternum, between the third and fourth ribs; more hollow and distant in its character; generally accompanied by distinct purring tremor; the sound, either single or double, synchronous either with the first or second sounds of the heart, or with both. The first sound is caused by regurgitation from the ventricle into the auricle, and is accompanied by a feeble and irregular pulse; the second is caused by an impediment to the passage of blood from the auricle to the ventricle. The sound produced by regurgitation, and accompanying the systole of the ventricle, is the one most commonly heard.

Valves of the pulmonary artery.—Very rarely diseased; murmur more superficial than in the case of the aorta, but heard in nearly the same situation. Indistinct in the course of the arch of the aorta, but audible towards the left clavicle.

Tricuspid valves.—Also very rarely diseased; murmur more distinct a little to the right of the mesial line, and about the centre of the sternum. If the disease were confined to this valve, the arterial pulse would be little, if at all, affected, whilst the venous pulse would be strongly marked. Generally speaking, the mitral valve is affected at the same time.

When the aortic and mitral valves are both diseased, the signs proper to both affections are combined. Diseases of the aorta itself, beyond the valves, will give rise to the same sound as disease of the valves themselves; and if the valves at the same time are diseased, a double murmur will be present; the first produced by the diseased coats of the vessel, and the second by regurgitation through the valves. The diseased coats of the aorta are accompanied by dilatation and loss of elasticity, giving rise to a peculiar thrilling pulse.

The diagnosis of the diseases of the valves of the heart may be greatly assisted by bearing in mind the following facts:—1. These diseases are much more frequent on the left than on the right side of the heart. 2. When they occur on the right side, the left is generally affected at the same time. 3. Diseases of the right side are marked by the venous pulse, and but little change in the arterial circulation, the pulse being only so far affected as the circulation is retarded. 4. Diseases of the left side have less effect on the venous circulation, and do not occasion the venous pulse, but they have a marked effect on the arterial circulation. 5. Sounds, whether on the right or left side, which accompany or take the place of the first sound of the heart, or the systole of the ventricles, and are synchronous with the pulse, are due to the passage of the blood out of a ventricle—that is to say, to regurgitation into the corresponding auricle, or onward movement into the corresponding artery. 6. Sounds, whether on the right or left side, which accompany or take the place of the second sound of the heart, or the diastole of the ventricle, and are not synchronous with the pulse, are due to the entrance of blood into the ventricles, in consequence of the contraction of the corresponding auricles or regurgitation from the corresponding arteries. 7. Sounds which are heard at the base of the heart and in the course of the aorta towards the right clavicle, becoming less audible towards the apex of the heart, indicate disease of the valves or coats of the aorta. If the sound accompanies the contraction of the ventricle, and is synchronous with a regular, equal, *thrilling* pulse, it is due to disease of the valves or coats of the aorta; but if the sound accompanies the diastole of the ventricle, is not synchronous with the pulse, the pulse, at the same time, being abrupt and *jerking*, and the abrupt second sound of the heart being absent or very obscure, the sound is due to reflux through the open valves of the aorta. 8. If, on the other hand, the sound is synchronous with the systole of the ventricle, and with the pulse, the pulse, at the same time, being unequal and irregular, the sound is due to the reflux of the blood from the left ventricle, through a diseased mitral valve, into the left auricle, but if the sound is not synchronous with the contraction of the ventricle, it is due to the passage of the blood from the auricle to the ventricle, through a diseased mitral valve. 9. The same rules apply to the right side of the heart, which, however, is rarely the seat of disease. If the disease were in the pulmonary artery, the sound would be heard in the track of that vessel, towards the left clavicle.

The *treatment* of valvular disease of the heart will consist in the occasional and cautious abstraction of blood by a small orifice, great moderation in diet, and an abstinence from all violent exertions of the body, and from strong mental emotions. In the more advanced stages of the disease, the treatment must be determined by the existing complications. The general principle of the treatment will be to avoid all excitement of the circulation, and the use of remedies which impair the power of the heart; at the same time relieving any unusual embarrassment of the circulation by moderate depletion.

See also on this subject, Part I. pp. 156 to 167.

CARDITIS.

SYMPTOMS.—Carditis, or inflammation of the substance of the heart, rarely occurs as a distinct affection, and the post-mortem appearances which characterize its previous existence have generally been found combined with pericarditis, or endocarditis, or both. This, however, does not prove that the muscular tissue of the heart may not be separately affected, for it may be diseased, and yet the disease may not necessarily prove fatal. If articular rheumatism affecting the fibrous tissues of the joints, may attack the fibrous tissues of the heart, there is the strongest reason from analogy to believe that muscular rheumatism, attacking the muscular fibre alone, or the cellular tissue by which it is enveloped, may affect the heart in common with other muscles.

Such a disease would probably be characterized by simple palpitation, with strong and abrupt contractions of the organ, a very frequent, full, and bounding pulse, and a dull heavy sensation in the region of the heart, with paroxysms of severe darting or shooting pain in the heart itself, extending to the shoulders and down to the arms; with some degree of dyspnœa. These symptoms would accompany or follow muscular rheumatism in other parts of the body.

I have known such symptoms supervene on a severe attack of muscular rheumatism, without any indication of inflammation in the pericardium or endocardium. The treatment, in such cases, would be that of muscular rheumatism, with counter-irritation to the region of the heart, and, in the most severe cases, general or local depletion. (G.)

The existence of inflammation of the structure of the heart itself is proved by several recorded cases of softening, suppuration, ulceration, and perforation of the cardiac parietes. The symptoms, during life, are not sufficiently characteristic to admit of precise description.

HYPERTROPHY OF THE HEART.

SPECIES.—1. Simple hypertrophy. 2. Hypertrophy with dilatation (eccentric). 3. Hypertrophy with contraction (concentric).

SYMPTOMS.—Palpitation; a strong, regular, and frequent pulse, small in hypertrophy with contraction, full in hypertrophy with dilatation; slight dyspnœa, increased on exertion; a florid skin, and the appearance of unusually good health. In more severe cases, increased dyspnœa, flushed countenance and bright eye; headache, vertigo, active hæmorrhage from the nose, or from the hæmorrhoidal vessels; and a tendency to local inflammations. In a still more advanced stage, all the above symptoms are increased in severity, and œdema supervenes, usually beginning in the face, and gradually extending to other parts of the body. There is often the most profuse sweating. In the end, the hypertrophy is complicated with disease of other important viscera, which is the immediate cause of death.

PHYSICAL SIGNS.—Impulse of the heart greatly increased in force, prolonged and extending over a large space, visible to the eye, and strongly raising the hand of the observer; the first sound of the heart obscure, when there is little or no dilatation; louder, more abrupt, and heard over a larger space, where dilatation is at the same time present; the second sound obscure in the former case, unusually distinct in the latter. When the palpitations are most violent, there is the bellows sound, but it disappears with repose. On percussion, there is dulness, varying with the degree of enlargement, and most extensive where dilatation is combined with hypertrophy. In some instances there is prominence and increased breadth of the left side of the chest. When the right side of the heart is affected, the dulness on percussion is most marked behind the lower part of the sternum, the venous pulse is strongly marked, while the arterial pulse undergoes but little change. In hypertrophy, with dilatation of the left side of the heart, the symptoms and complications are those of the general circulation—viz., active hæmorrhages and acute inflammations. When the hypertrophy affects both sides of the heart, symptoms referable to the lungs are combined with those affecting the system at large.

Complications and secondary affections.—Valvular disease, sometimes the cause, at others the consequence, of hypertrophy. Aneurism, hæmorrhage, dropsy, inflammatory diseases, visceral enlargement, cerebral and pulmonary apoplexy. Fatty degeneration of the liver and kidneys combined with dropsy is not an uncommon consequence of hypertrophy of the heart.

Causes.—Violent exertion, long-continued straining as in gymnastic exercises, strong mental emotions, plethora, obstructions in the large vessels or in the heart itself, long-continued palpitations, inflammation of the lining membrane, or of the pericardium; chronic diseases of the lungs, especially emphysema.

Prognosis.—The disease may continue for many years, and generally proves fatal, in consequence of some of the secondary affections mentioned above.

Treatment.—Perfect quiet of body and mind, a spare diet, gentle aperients, the occasional cautious abstraction of blood from the arm, or from the region of the heart by cupping. A combination of opium and digitalis in small doses (five drops of laudanum with five or ten drops of tincture of digitalis, given two or three times a-day), and the external application of the emplastrum belladonnæ.

Remedies.—Hydrocyanic acid; opium, or digitalis, applied externally to a blistered surface; counter-irritants. Mercury?

ATROPHY OF THE HEART.

Symptoms.—Occasional syncope, in some cases, and the symptoms of angina pectoris in others. Sudden death under change of posture or slight exertion, the patient having previously suffered under debility, with great pallor of countenance and anasarca. In some instances, however, the patient is stout and apparently healthy. The pulsations of the heart small and feeble, the impulse much weaker than natural, and scarcely felt by the hand, and the sounds indistinct. The pulse is very compressible, small in atrophy without dilatation, and full in atrophy with dilatation, and commonly below the natural frequency.

CAUSES.—*Predisposing.* The male sex; age about 50; habits of intemperance; exhausting diseases, such as hæmorrhage, typhus fever, pulmonary consumption, dropsy, and pulmonary emphysema of long continuance.

Proximate.—Compression of the heart by deposits of fat, by effusion of fluid, by tumours, or by any other mechanical cause; fatty degeneration of the muscular tissue of the heart itself, embracing the whole heart or one or other of the ventricles, more commonly the right; contraction of the coronary arteries.

MORBID ANATOMY.—For the morbid microscopic appearances characterizing fatty degeneration with atrophy of the muscular structure, see plate, Part I., p. 79. Fatty degeneration of the liver and kidneys, and of the aorta, emphysema of the lungs, and ulceration of the stomach, are common concomitants.

TREATMENT.—Nutritious diet, with tonics (among which steel is to be preferred) or stimulants, according to the degree of the existing debility. Great care and watchfulness on the part of the attendants, if the disease is suspected during life. The disease itself does not admit of cure.

DILATATION OF THE HEART.

SPECIES.—Dilatation with hypertrophy (*active*), dilatation with thinness of the parietes (*passive.*)

For the symptoms of dilatation with hypertrophy, see Hypertrophy.

SYMPTOMS *of dilatation with thinness of the parietes.*—This is of most common occurrence on the right side. A fluttering of the heart; a full, frequent, weak, and irregular pulse; swelling of the veins of the neck; distinct venous pulse; great dyspnœa; a dusky skin; a bloated and anxious countenance; drowsiness; slight delirium; dropsical effusions.

PHYSICAL SIGNS.—Feeble impulse, felt, however, over a greater extent than usual; first sound short and peculiarly distinct, heard over a great extent of the chest both before and behind. In dilatation with hypertrophy, strong impulse with clear sound.

Causes.—Obstruction to the pulmonary circulation, pulmonary emphysema, long-standing diseases of the lungs, valvular diseases of the left side of the heart.

Prognosis.—Unfavourable, but in the absence of severe complications, of dropsical effusions, or of great debility, the patient may survive for a considerable period.

Treatment.—Repose of body and mind, careful regulation of the diet, aperient medicines. Gentle opiates or sedatives may occasionally be of service to allay irritability. If the circulation be greatly embarrassed, small bleedings by cupping or leeches may be had recourse to. For the treatment of hypertrophy with dilatation, see Hypertrophy.

Partial dilatation, or *true aneurism* of the heart, consists in a protrusion of some portion of the parietes of the heart, in consequence of ulceration of the muscular tissue, and is an equally rare, obscure, and fatal disease. Its general symptoms differ little from those of more general dilatation of the cavities of the heart; the physical signs are equally obscure; the prognosis of the disease, when recognized, is in the highest degree unfavourable, and the treatment similar to that for more general dilatation—complete repose of body and mind, the cautious use of narcotic and sedative remedies, and, in cases of extreme urgency, cautious local depletion.

CYANOSIS—BLUE DISEASE.

Symptoms.—A blue colour of the skin, lips, and lining membrane of the mouth; universal coldness of the surface; palpitation; fits of extreme dyspnœa, sometimes almost amounting to asphyxia; faintness, or actual syncope, on slight exertion, or from mental excitement; feeble and irregular pulse; œdema or dropsical effusions.

Anatomical Characters.—A communication between the two sides of the heart, or between the two sets of vessels arising from it, with disproportionate strength of the two ventricles, generally combined with narrowing of the pulmonary artery. Extreme contraction of the pulmonary artery alone.

Physical Signs.—A very loud and superficial murmur immediately over the seat of the communication.

Prognosis.—Death during a paroxysm at an early age; in rare instances the patient attains the adult age; and in one case recorded by Louis, the age of fifty-seven.

Treatment.—Rest of mind and body; pure air; warm clothing; strict diet; careful attention to the state of the stomach and bowels; and cautious treatment of complications.

DISEASES OF THE PERICARDIUM.

Hydro-pericardium . . Dropsy of the Heart.

HYDRO-PERICARDIUM.

Species.—1. Active, from inflammatory action in the pericardium. 2. Passive, from obstruction to the circulation.

Symptoms.—In the case of *active* effusion, the result of inflammatory action, the symptoms of pericarditis are, or have been, present. (See *Pericarditis*.)

The symptoms of *passive* dropsy of the pericardium are generally obscure. They are, a sense of weight and oppression in the præcordia, dyspnœa or orthopnœa, a dusky, suffused countenance, a tendency to syncope, œdema, and a small, frequent, and irregular pulse. The patient usually sits up in bed, and is fearful of making the least exertion, or the slightest change of position.

Physical Signs.—In the case of considerable effusion, striking prominence of the præcordia, with bulging of the corresponding intercostal spaces, extensive dulness, reaching sometimes from nipple to nipple, and nearly the whole length of the sternum; the pulsations of the heart imperceptible in the supine position, and shifting their place in the erect and semi-erect posture; the sounds indistinct in the region of the heart, but more audible at the upper part of the chest; the dulness on percussion varying its situation and extent with the posture of the patient. This part of the diagnosis requires the patient to assume successively the supine, and the erect or semi-erect postures, and to lie on either side.

Prognosis.—Extremely unfavourable.

Causes.—Long-continued obstructions to the circulation of blood through the lungs, or through the parietes of the heart.

Treatment.—That of dropsies in general, by drastic purgatives, diuretics, &c., modified according to the state of the patient and existing complications. Paracentesis has been recommended, and, in a few cases, practised with success. When the disease is dependent upon organic affections of the heart or lungs, such an operation is inadmissible, but when the disease is strictly idiopathic and dependent upon local inflammation, it might be resorted to, after the failure of other means.

DISEASES OF THE ARTERIES.

ANEURISM.

ANEURISM OF THE AORTA.

SPECIES.—1. Thoracic; 2. Abdominal.

1. ANEURISM OF THE THORACIC AORTA.

SYMPTOMS.—The general symptoms produced by an aneurismal tumour in the chest are the same as those due to any other tumour of equal size and similar situation—*dyspnœa*, by encroaching on the lungs, or pressing on the air-passages; *aphonia*, by compressing the recurrent laryngeal nerves; *dysphagia*, by pressing on the œsophagus; *obstruction to the venous circulation*, accompanied in extreme cases by dropsical effusions into the cellular membrane of the face, neck, chest, and upper extremities, by compressing the large venous trunks; *neuralgia of the back, and paraplegia*, from pressure on the spine, followed by absorption of the vertebræ; *inanition*, by pressing on the thoracic duct.

DIAGNOSIS.—This is sometimes very difficult, when the tumour occupies the origin of the aorta, or when, whatever be its situation, it is of small size. When the tumour is situated in the more remote portions of the aorta, or in its first branches, and especially when it has so far increased as to rise out of the chest, the diagnosis becomes comparatively easy. When, again, the tumour, as it gradually increases in size, causes the protrusion of the sternum or ribs, or leads to their gradual absorption, we are much assisted in the diagnosis, for in such cases there is always a *primâ facie* evidence in favour of aneurism.

The circumstances which would tend to confirm our first suspicion as to the nature of the tumour are, pulsation of the tumour; sudden and copious hæmorrhage of bright-red blood, or a less amount often repeated, from the lungs or stomach; a *whizzing* or bellows sound, sometimes single, and more rarely double, in the situation of the tumour; a peculiar thrilling sensation communicated to the hand; and a quick thrilling pulse, generally much increased in frequency. Hæmorrhage from the lungs will obtain additional value as a sign of aneurism in the ascertained absence of symptoms of pulmonary consumption. When the tumour occupies the arch of the aorta, or the large vessels of the neck, or upper extremity, we may expect to find some marked change in the pulse at the wrist and in the neck. Sometimes there is an absence of the pulse at the wrist, of one or of both arms, and occasionally of one or both carotid arteries; and there are signs of disturbed circulation through the brain, such as giddiness, faintness, and indistinctness of vision. It is necessary to add, that the peculiar whizzing sound and the *bruit de soufflet* are not always present in cases of aneurism.

PROGNOSIS.—Unfavourable, but guarded, as a natural cure is sometimes effected. The disease may last for a considerable period before it proves fatal.

TREATMENT.—Perfect repose of mind and body, temperance, a moderate diet, a free state of bowels, occasional cautious depletion when urgent symptoms require it; a belladonna plaster to the region of the heart, and digitalis in moderate doses to keep down the action of the heart.

2. ANEURISM OF THE ABDOMINAL AORTA.

SYMPTOMS.—These also vary with the size and situation of the tumour, and the viscera upon which it presses. When the aneurism presses on the stomach, it gives rise to severe symptoms of dyspepsia; on the nerves of the solar plexus, to neuralgic pains; on the bowels, to obstinate constipation, or violent colic; on the nerves issuing from the spine, to severe pain in the loins, abdominal parietes, or lower extremities, simulating rheumatism of those parts, or sciatica, or lumbar or psoas abscess, or disease of the spine. By pressure on the rectum, it has sometimes led to a suspicion of stricture of that part, and it has been confounded with disease of the liver, spleen, or kidney. When the tumour occupies the upper portion of the abdominal aorta it may thrust up the diaphragm, and give rise to dyspnœa, and other symptoms of pulmonary disease.

DIAGNOSIS.—By careful examination, the tumour may often be found to occupy the situation of the aorta; it may be felt strongly pulsating, and having the peculiar *thrill* just described; and on applying the stethoscope, a short, harsh, bellows murmur may be distinctly heard. The pulsation is more uniformly diffused over an aneurismal tumour, than over any other abdominal tumour lying over the aorta; and the bellows sound is more harsh and grating than that occasioned by the pressure of such other tumours.

The prognosis and treatment are the same as those of aneurism of the thoracic aorta.

DISEASES OF THE VEINS.

PHLEBITIS . . Inflammation of the Veins.
PHLEGMASIA DOLENS.

PHLEBITIS—INFLAMMATION OF THE VEINS.

SYMPTOMS.—When occurring in the superficial veins, swelling and induration, sometimes accompanied by redness, in the course of the vein; pain greatly increased by pressure; œdema of the cellular tissue, and enlargement of the veins below the seat of the disease; repeated rigors, followed by typhoid fever, profuse sweats, offensive diarrhœa, great debility, anxiety, and irritability; a very frequent, weak, and sometimes intermittent pulse; and a yellow, muddy skin. As the disease advances, the joints often become painful and tender to the touch, symptoms of inflammation of the viscera or their serous investments sometimes show themselves, and collections of matter form in different parts of the body, accompanied by little or no inflammation of the surrounding textures.

Causes.—*Predisposing.* Cachexia.

Exciting.—In rare instances, cold; in the majority of cases, inflammation spreading from surrounding tissues, or injury done to the vein itself, as in the operations of bleeding, amputation, extraction of tumours, tying varicose veins, &c. Phlebitis is also very apt to supervene on fractures or operations p[illegible]rmed on bones. It often originates in injuries to the veins of the internal viscera, as of the uterus after childbirth, the umbilical cord of new-born children, surgical operations on hæmorrhoidal tumours, &c.

Anatomical Characters.—Discoloration of the inner coat of the vein; inflammation and thickening of the other coats; inflammation and suppuration of the surrounding textures; formation of coagula within the vein, which coagula become softened down, and are conveyed into the current of the circulation; deposits of pus in the cellular tissue of the trunk and limbs, in the joints and serous cavities, or in the lungs, liver, spleen, or kidneys. The most common seats of these deposits are the liver and the lungs.

Diagnosis.—From *absorbent inflammation*, by the larger size of the inflamed vessel, the vein feeling like a large, hard, knotted cord.

Prognosis.—Generally unfavourable, but guarded; more favourable in inflammation of the external veins, and especially in those cases which arise spontaneously, or from cold. Less favourable in traumatic phlebitis, and in that originating from injury to the veins of the internal viscera. The formation of secondary abscesses in external parts of the body may be regarded as a favourable indication.

Treatment.—Leeches in the course of the inflamed vessel; (bleeding from the arm is counter-indicated.) A position favourable to the return of blood to the heart, warm fomentations, or, if more agreeable to the patient, cold lotions. If the accompanying fever is of the inflammatory type, tartar-emetic and aperients, or calomel and opium; if of the typhoid type, wine, brandy, and diffusible stimulants, in combination with opium. In the great majority of cases the strength will have to be supported by cinchona, with a liberal allowance of wine or brandy. Close attention should be paid to any complaints of uneasiness, or pain in parts of the body remote from the seat of the disease, with a view to the discovery of collections of pus, and the prompt relief of the patient by the knife.

PHLEGMASIA DOLENS.

Synonym.—Phlegmasia Alba.

Symptoms.—From one to five weeks after delivery, a painful elastic swelling of one or both lower extremities, beginning generally in the groin, labia, and thigh, and thence extending downwards; characterized by great heat and tenderness, a pale, shining appearance of the surface, and stiffness of the limb. It is commonly ushered in by rigors, with pain in the loins or belly; and is accompanied by fever, thirst, a quick and frequent pulse, headache, nausea, and a furred tongue. The disease sometimes proves fatal, but more commonly subsides in about a fortnight or three weeks, leaving the limb swollen and weak.

Causes.—*Predisposing.* The puerperal state.
Exciting.—Inflammation of the internal or external iliac and femoral veins, or of the veins of the uterus and viscera of the pelvis.

Diagnosis.—From *œdema*, by the elastic nature of the swelling, and the absence of pitting on pressure. From *common inflammation of the cellular tissue and skin*, by the pale, shining aspect of the surface.

Prognosis.—Generally favourable, but recovery tardy.

Treatment.—Leeches to the most painful parts of the limb; warm fomentations; opium in large doses, with calomel, blue pill, or hydrargyrum c. cretâ, given so as to affect the mouth. From half a grain to a grain of opium, with two grains of blue pill, may be given three or four times a-day, till the system is sensibly affected. The limb should be kept in the horizontal position or slightly raised; and the bowels should be acted on by gentle aperients. If there is much fever present, a sixth of a grain of tartar-emetic may be combined with the opium and blue pill.

CHAPTER III.

DISEASES OF THE ORGANS OF RESPIRATION.

1. Of the Larynx and Trachea.
2. Of the Bronchial-tubes and Air-cells.
3. Of the Substance of the Lungs.
4. Of the Pleura.

DISEASES OF THE LARYNX AND TRACHEA.

Laryngitis	Inflammation of the Larynx.
Tracheitis	Croup.
Laryngismus Stridulus	Crowing inspiration.

LARYNGITIS—INFLAMMATION OF THE LARYNX.

Species—1. Acute; 2. Chronic.

1. ACUTE LARYNGITIS.

Symptoms.—After rigors, followed by pyrexia, and usually by some degree of inflammation in the tonsils, there is hoarseness; a husky and convulsive cough; pain in the larynx, generally increased by pressure, with a sense of constriction in that part, and constant hawking of glutinous mucus; the respiration difficult and sonorous; the act of swallowing painful, and often followed by convulsive fits, coughing, and dyspnœa. There is inflammatory fever, with flushed face, hot skin, full and hard pulse. The fauces are generally red and swollen; and, if the tongue be pressed downwards and forwards, the epiglottis may be seen thickened and inflamed. These symptoms are followed by others of greater severity and more formidable character. The countenance becomes pale and anxious; the lips livid; the eyes suffused; the nostrils expanded; the pulse frequent, feeble, and irregular; the voice reduced to a whisper, or lost; the throat often œdematous. There is extreme restlessness; jactitation; urgent fear of suffocation; sleeplessness, or, if the patient dose, he wakes in a dreadful agitation, gasping and struggling for breath. Delirium and coma ensue, and death takes place in from four to five days, or the patient dies at an earlier period asphyxiated.

Anatomical Characters.—Injection and thickening of the lining membrane of the larynx, with œdema of the submucous cellular tissue; the glottis and epiglottis red and swollen, and containing serum, sero-purulent fluid, or pus; œdema of the surrounding cellular membrane.

In some cases, œdema of the glottis is the only post-mortem appearance.

CAUSES.—*Predisposing.* Previous attacks of cynanche tonsillaris, intemperance, abuse of mercury, frequent and long-continued exertions of the voice; the adult age.

Exciting.—Exposure to wet and cold; extension of inflammation from the tonsils or salivary glands; swallowing scalding or corrosive liquids; inhaling acrid gases or hot air; extension of inflammation in erysipelas, scarlatina, small-pox, and measles.

DIAGNOSIS.—From *diseases of the chest* by the local affection and the absence of the physical signs of those diseases; from *spasmodic affections of the larynx*, by the presence of fever and local pain, and by the gradual progress of the disease; from *tracheitis*, by the absence of the peculiar stridulous voice, and of the croupy inspiration. The subjects of laryngitis are also, as a general rule, much older than patients suffering from croup.

PROGNOSIS.—Most unfavourable; more so when the disease has already lasted some time, with an increase of the symptoms, when the dysphœa is extreme, the convulsive fits of frequent occurrence, the face livid, the circulation languid, and the head affected. On the other hand, a decrease of dyspnœa, a free expectoration, an improved aspect of countenance, and greater ease in swallowing, are favourable signs.

TREATMENT.—*Indications.* I. To reduce inflammatory action and prevent effusion. II. Effusion having taken place, to promote the absorption of the effused matter. III. In extreme cases, to remove the mechanical obstruction to the respiration.

I. Inflammatory action can be reduced, and effusion prevented only by the most prompt and active measures. Bleeding to the *approach* of syncope, repeated, if necessary, and followed by tartarized antimony, in combination with calomel and opium in full doses. We may give two, three, or four grains of calomel, with from an eighth to a sixth of a grain of tartarized antimony, and a third or half of a grain of opium every one, two, or three hours, according to the urgency of the symptoms. The object of this treatment is to reduce inflammation by means of the tartar-emetic, to supersede inflammatory action by inducing salivation as speedily as possible by the mercury, and to soothe the existing irritation by the opium. The local treatment, in the early stage, consists in leeches to the throat. (Counter-irritants should be reserved for the more advanced stages of the complaint.) Ice should be held in the mouth, and applied around the throat.

II. The second indication is fulfilled by mercury, and by that alone. This remedy should be resorted to without loss of time. It may be taken internally, and rubbed in at the same time. When effusion has actually taken place, bleeding is of little use, except to counteract the urgent symptoms which may supervene. Counter-irritation may now be employed with advantage in the form of blisters, acetum cantharidis, or strong ammonia, to the side of the neck. Where laryngitis supervenes on other diseases, the treatment must be appropriate to both complaints, and be modified according to the state of the system.

III. The mechanical effects of the inflammation and effusion can be obviated, and the obstruction to the respiration removed only by making an opening into the trachea. This operation should not be delayed too long. When, in spite of remedies, the dyspnœa increases rapidly, and there is urgent danger of suffocation, an operation should be resorted to without loss of time. After the operation, the edges of the opening must be kept separated, so as to admit the free passage of air.

Throughout the treatment the patient should be prevented from talking.

2. CHRONIC LARYNGITIS.

SYMPTOMS.—Hoarseness, sometimes increasing till the voice is reduced to a whisper, or quite lost; dry, husky cough; pain or soreness in the larynx, increased by lateral compression or backward pressure. The cough is brought on by any unusual exertion, or by the inhalation of cold air, and is accompanied, in the first stage, with scanty mucous expectoration; in more advanced cases, and where ulceration is present, with purulent sputa, mixed with streaks of blood; or there is a sanious fetid expectoration. In confirmed cases, dyspnœa is an invariable attendant, coming on generally in paroxysms, and leaving the patient nearly free in the intervals. In the last stage of the disease, the dyspnœa is increased to orthopnœa, obliging the patient, during the fits, to sit up in bed. In the intervals of the paroxysms, the breathing has a peculiar hissing sound. The patient does not long survive the appearance of orthopnœa, and generally dies asphyxiated.

ANATOMICAL CHARACTERS.—Inflammation and its consequences in the mucous and submucous textures of the larynx; enlargement of the mucous follicles; œdema; ulceration of the mucous membrane; ossification, or caries of the cartilages.

CAUSES.—The acute form, of which it is often the sequel; catarrh; indulgence in spirituous liquors; excessive exertions of the voice; injuries to the larynx; the inhalation of air loaded with dust or irritating particles of matter; syphilis; the abuse of mercury; tuberculous matter deposited in the mucous membrane of the larynx. Ulceration from this cause occurred in about a fourth of the cases of phthisis quoted by Louis.

DIAGNOSIS.—The permanent change of the voice, the cough, the hissing breathing, and the pain or tenderness in the larynx, will serve to distinguish this from other forms of disease. The tuberculous variety may often be distinguished from the effect of simple inflammation or relaxation, by the coexistence of the symptoms and physical signs of phthisis. (See Phthisis Pulmonalis.)

PROGNOSIS.—This will depend on the history of the case. The absence of signs of disease of the chest is favourable; as is also its evident dependence upon some mechanical cause, or on syphilis. The continuance of the symptoms, without intervals of freedom, is highly unfavourable.

TREATMENT.—*Indications.* I. To reduce the chronic inflammation. II. To promote the absorption of effused fluids. III. In cases of relaxation of the mucous membrane, to restore tone to the part. IV. To relieve urgent symptoms. V. To improve the general health.

I. The chronic inflammation of the larynx may be subdued by the repeated application of a few leeches to the upper part of the throat, and by counter-irritants, such as blisters, mustard-poultices, and tartar-emetic ointment. The part itself should, at the same time, be kept at rest, the patient being prevented from talking more than is necessary, and never above a whisper.

II. To fulfil the second indication, the promotion of absorption, mercury should be given in small doses, so as to affect the mouth, or the hydriodate of potash, in five-grain-doses, three or four times a-day.

III. To restore the tone of the relaxed mucous membrane, various remedies have been recommended: the inhalation of steam holding some gentle stimulant in solution, as ammonia, camphor, turpentine, or one of the balsams; or the still stronger stimulants, applied directly to the part, in a liquid or solid form. Nitrate of silver, corrosive sublimate, and sulphate of copper, have been recommended for this purpose. The preference should be given to a strong solution of the nitrate of silver, applied by means of a small probang to the epiglottis and upper part of the larynx. If solid substances are preferred, they must be used in the form of an impalpable powder, and drawn into the larynx through a tube. Trisnitrate of bismuth; calomel with twelve times its weight of sugar; red precipitate, sulphate of zinc, or sulphate of copper, mixed with thirty-six times their weight of sugar; alum with twice its weight; and acetate of lead with seven times its weight—are remedies suitable for this purpose.

IV. The urgent symptoms consist chiefly in paroxysms of dyspnœa or convulsive cough. These may be relieved by narcotics and sedatives, as opium, æther, camphor, belladonna, or stramonium, inhaled or given internally. The lozenge is the most convenient form. Where urgent symptoms are found to admit of no relief, an operation may be necessary.

V. The improvement of the general health may be brought about by tonics, especially steel, nourishing and wholesome diet, bracing air, the cold or shower bath, and strict attention to the stomach and bowels, and to the state of the secretions generally.

TRACHEITIS—THE CROUP.

SYNONYM.—Cynanche trachealis.

SYMPTOMS.—The disease generally commences gradually, beginning with hoarseness and wheezing, short dry cough, and sometimes a rattling in the throat during sleep, the child often raising the hand to the throat. The difficulty of breathing increases, and at length becomes indescribably anxious; the face is flushed, and the veins of the neck swollen; the voice, in speaking and coughing, acquires a shrill and peculiar sound, similar to the crowing of a cock, or to the noise which a fowl makes when caught in the hand. The sound of inspiration at first resembles the passing of air through a piece of muslin; afterwards through a metallic tube. At the commencement of the disease, the cough is dry; soon, however, a viscid matter is brought up, with portions of membrane of a whitish colour; and the efforts made to expectorate these are often so distressing as to threaten strangulation. The disease is accompanied by the symptoms of inflammatory fever, and most frequently terminates fatally about the second or third day, when the patient expires from suffocation.

ANATOMICAL CHARACTERS.—Inflammation of the lining membrane of the trachea, and the consequent formation of a false or adventitious membrane, which may extend from the trachea into the bronchi, and become so thick as to fill the windpipe, and cause suffocation. Large portions of this matter, bearing the shape of the tube, have been expelled by vomiting. The inflammation generally extends upwards to the larynx as well as downwards to the bronchi.

CAUSES.—*Remote and predisposing.* Its attack is mostly confined to children between the age of three and thirteen years.—*Exciting.* It is most frequent in low and damp situations, and on the sea-shore. It may be induced by any of the causes of inflammation. It has been epidemic, and is by some supposed to be contagious.

DIAGNOSIS.—The peculiarity of breathing, of speaking, and of coughing above described, are the pathognomonic symptoms.

From *laryngismus stridulus.*—This disease attacks children of the same age, and is attended with symptoms much resembling those of croup. It is distinguished from croup by its consisting of repeated paroxysms, having longer or shorter intervals of perfect freedom of respiration. The attack is also more sudden, and not attended with inflammation or fever; and it is unattended with expectoration.

PROGNOSIS.—The disease is attended with great danger.—*Favourable symptoms.* Early and copious expectoration, the breathing not much impeded, the voice little changed, the febrile symptoms moderate.

Unfavourable.—Great anxiety and difficulty of breathing, violent fever, the sound of the voice becoming more acute, no expectoration.

Treatment.—*Indications.* I. To subdue inflammation. II. To obviate urgent symptoms.

I. The first indication is fulfilled by bleeding from the arm, or, in the case of very young children, by the free application of leeches to the larynx and trachea. The abstraction of blood should be followed up by a warm bath and tartar-emetic in nauseating doses, combined with the remedies necessary to fulfil the second indication. The treatment may be commenced by an emetic of from half a grain to a grain of tartar-emetic, according to the age of the child. The bowels should also be freely opened.

Submuriate of mercury, administered so as to excite salivation, should be combined with the tartar-emetic, so as promptly to affect the system, and prevent the further effusion of lymph.

As it is important to affect the system as rapidly as possible, mercurial ointment may be rubbed into the thighs or axillæ. Mercury may be used with the more freedom in children, as the system is with difficulty affected by it.

II. If the symptoms become extremely urgent, the false membrane may sometimes be brought up by the operation of an emetic. When long tenacious flakes of membrane are brought up by coughing, their removal may often be facilitated by the hand. If suffocation is threatened, the operation of tracheotomy must be performed.. This operation, however, will often fail, as the inflammation frequently extends to the bronchial tubes which are filled with false membrane. The operation of tracheotomy is best performed by laying bare the cartilaginous rings of the trachea, raising them with a hook, and removing a lozenge-shaped piece with a scissors or bistoury.

Venæsection; leeches along the trachea; an emetic; the warm bath; a sinapism to the throat for a quarter of an hour; and repeated doses of calomel, in combination with tartar-emetic, form the principal items of the treatment.

In extreme cases, sinapisms or blisters should be applied to the legs. In the case of children, the former should not be left on more than five or ten minutes, and the latter above three hours.

LARYNGISMUS STRIDULUS—SPASMODIC CROUP.

Synonyms.—Crowing inspiration; child-crowing; spasmodic asthma of children; thymic asthma.

Symptoms.—The principal feature of the disease is a remarkable crowing inspiration, unattended by cough, coming on suddenly, and often on first waking from sleep. For a short time, the child makes ineffectual efforts to inspire air, and struggles violently, but at length the difficulty is overcome, and the breath is drawn in with a loud crowing sound. If the impediment is less complete, the respiration is hurried and laborious, each inspiration being attended by the peculiar crowing sound; the face becomes livid, the eyes staring and suffused, convulsions supervene, the thumbs are clenched in the hands, the fingers and toes are flexed, and the joints of the wrist and ankle forcibly bent. In extreme cases, death takes place by asphyxia, or the little patient falls, pale and exhausted, into the nurse's lap.

PATHOLOGY.—Irritation reflected through the inferior or recurrent laryngeal nerve upon the muscles of the larynx, in consequence of remote irritation of the gums, bowels, &c. A diseased condition of the bronchial and cervical glands, producing irritation of the eighth pair and recurrent nerves.

CAUSES.—*Predisposing.* Infancy; from birth to the age of three years; the scrofulous diathesis.—*Exciting.* Teething; intestinal irritation; worms; enlargement of the absorbent glands of the neck and chest; cutaneous affections of the scalp and face.

DIAGNOSIS.—From *croup,* by the sudden accession and departure of the fits; by the freedom of the breathing in the intervals; by the absence of febrile or catarrhal symptoms; and, except in rare cases during the fit, of cough. Also, in most cases, by the presence of hot and swollen gums, glandular enlargements of the neck, and symptoms of intestinal irritation.

PROGNOSIS.—The disease sometimes proves fatal, but more commonly terminates favourably.

TREATMENT.—*During the paroxysm.* The warm bath, hot water to the throat, fresh air, and sprinkling of the face and chest with cold water.—*During the intervals.* The treatment must depend on the existing causes of irritation. When these are removed, if the disease should still continue, change of air, with a diet adapted to the child's age, and attention to the state of the bowels, will generally effect a cure.

Spasmodic diseases of the larynx, marked by croupy respiration, convulsive cough or loss of voice, are of frequent occurrence in females, and belong to the long list of anomalous affections which are apt to occur in hysteria. They must be treated in the same way as other hysterical symptoms.

DISEASES OF THE BRONCHIAL TUBES AND AIR-CELLS.

CATARRHUS	Catarrh.
CATARRHUS EPIDEMICUS . .	Influenza.
BRONCHITIS	Bronchitis.
ASTHMA	Asthma.
EMPHYSEMA	Emphysema.
PERTUSSIS	Hooping-cough.
BRONCHIAL POLYPI.	

CATARRHUS—CATARRH.

Acute catarrh, or what is commonly called "a cold," is a febrile affection, complicated in the majority of cases with inflammation of one or other of the mucous membranes. If confined to the mucous membrane of the eyes and nostrils, it is called *coryza*, or *a cold in the head;* if it extend to the bronchial tubes, it is termed, *bronchitis;* if it attack the mucous membrane of the bladder, it becomes a *catarrhus vesicæ.* Sometimes the inflammation, instead of attacking the mucous membrane of the air-passages, affects that of the alimentary canal, and is attended with sickness and diarrhœa, or with both together, assuming the form of gastritis, enteritis, or gastro-enteritis mucosa. Its essential characters, therefore, are an increased secretion of mucus from the lining membrane of the nose, fauces, bronchi, intestinal canal, or bladder, attended with pyrexia.

SYMPTOMS.—Slight rigors followed by pyrexia; weight and pain in the head; oppression of the chest, and impeded respiration; sense of fulness and stopping up of the nose; repeated sneezing; watery inflamed eyes; cold shiverings, succeeded by transient flushes of heat; soreness of the fauces and tonsils; herpetic eruptions on the lips; cough; pains about the chest; rheumatic pains in the back, neck, and head; increased secretion of mucus from the mucous membrane of the nose, fauces, bronchi, &c. When the disease assumes the chronic form, the symptoms are those of inflammation of the mucous membrane originally or principally affected. As this is most frequently the mucous membrane of the air-passages, "catarrhus" and "bronchitis" are frequently employed as synonymous terms. The term catarrh is, however, here used to designate a febrile affection, complicated with inflammation of one or other of the mucous membranes; those inflammations being afterwards treated as separate diseases.

CAUSES.—Cold, or wet and cold, applied to the body; contagion?

PROGNOSIS.—It is seldom attended with immediate danger, but often lays the foundation for serious diseases.

TREATMENT.—*Indication.* To reduce the existing fever and allay irritation.

If the fever run high, the best remedy is tartar-emetic in nauseating doses and at short intervals, with cooling drinks and saline purgatives; but where the fever is inconsiderable, or the cold stage still continues, an opposite plan of treatment will be equally effectual, and the above indication may be fulfilled by ten grains of Dover's powder given over night, followed by the warm bath, or warm water to the feet, a basin of warm gruel, and a hot bed. By these means a profuse perspiration is excited, which effectually removes the febrile action. The Dover's powder may be followed up next morning by a saline aperient. A large draught of cold water, taken at bed-time, will often effectually remove a common cold.

The treatment of the accompanying inflammation must vary with the mucous membrane affected. If the symptoms are those of coryza in the severe form, relief may be obtained by holding the head over the steam of hot water, or bathing the eyes repeatedly with warm water. For the remedies appropriate to the other inflammations, see the diseases themselves.

CATARRHUS EPIDEMICUS—INFLUENZA.

Symptoms.—Rigors, lassitude, weariness, severe pains in the head, back, and loins, followed by flushing, feeling of weight in the head and oppression at the chest, redness and suffusion of the eyes, sneezing and tingling at the nose, with an acrid discharge from the nostrils, herpetic eruption on the lips, redness and soreness of the fauces and tonsils, a frequent short cough, with expectoration, at first of a thick, viscid mucus, afterwards of opaque, muco-purulent, or purulent matter. The pulse is small and frequent at the commencement of the disorder, and towards the decline often becomes slow, and sometimes irregular. There are loss of appetite, nausea, or vomiting, a furred tongue, the urine scanty and turbid, the skin at first hot and dry, afterwards covered with profuse perspiration. With these symptoms there is extreme prostration of strength, loss of energy, and depression of spirits. Sometimes there is extreme debility without accompanying local symptoms.

Terminations and Complications.—Bronchitis, pneumonia, pleuritis; inflammation of the brain or its membranes; muscular and articular rheumatism; cynanche tonsillaris; diarrhœa and dysentery; skin disease; erysipelas; typhus.

Causes.—The disease is epidemic, and dependent upon some peculiar condition of the atmosphere.

Diagnosis.—From *common catarrh*, by the greater prevalence of the complaint, and by the extreme debility which attends and follows it. From common *ephemeral fever*, by the extreme prostration, and in many cases by the herpetic eruption on the lips.

In the epidemic of 1844–5, several cases of influenza assumed a well-marked remittent character, with exacerbations on alternate days. In many cases the herpetic eruption on the lips served to show the real nature of the malady. (G.)

Prognosis.—Rarely fatal to the young and robust, unless it be complicated with very severe local affections; dangerous to the feeble and aged.

Treatment.—In mild cases, that of catarrh; in severe ones and in aged persons, stimulants, combined with opiates (℞. Ammoniæ sesquicarb. gr. v. Tinct. Opii ♏v. Mist. Camphoræ ℥i., ter die), with a nourishing diet, and liberal use of wine, and local treatment appropriate to the existing complication. General bloodletting is contraindicated, except in very rare instances, the local remedies being generally sufficient to remove or mitigate any symptoms which may occur. The state of the bowels should be carefully attended to, and the diet must be strictly regulated. Throughout the treatment it must be borne in mind that the debility is real, not the result of oppression of the nervous power, but a depression of strength. For the treatment of the local complications, see the several diseases themselves.

BRONCHITIS.

Species.—1. Acute; 2. Chronic; 3. Bronchitis, vel catarrhus senilis.

1. ACUTE BRONCHITIS.

Symptoms.—The general symptoms are those of catarrh in its most severe form, or they are those of common continued fever. The symptoms referable to the chest are oppression and sense of constriction, rarely attended with actual pain within the chest, but often combined with muscular pains, which are a part of the original catarrh, or the consequence of the effort of coughing; the pain is not increased by a deep and slow inspiration. There is dyspnœa increased by exertion, and cough, attended by expectoration, which is scanty at first, then more copious, of a white glairy appearance, resembling white of egg; in still more advanced stages it is muco-purulent or purulent, and sometimes, though rarely, tinged with blood. The symptoms are generally more severe towards evening, when there is an increase of feverish symptoms. In favourable cases, the severity of the symptoms abates between the fourth and eighth day; the dyspnœa subsides, the expectoration gives more relief, the febrile symptoms disappear, and the patient recovers, or the disease passes into the chronic form.

Acute bronchitis often occurs in children: its most severe and urgent form has received the name of suffocative catarrh, and is characterized by a sudden and copious secretion of mucus, accompanied by extreme and urgent dyspnœa.

2. CHRONIC BRONCHITIS.

SYMPTOMS.—This disease is the sequel of the acute form, or commences as a common cold in the young and middle-aged, and continues a month or two. In middle-aged or old persons it returns every winter with increased severity, and reappears for several years in succession; in which case it is called winter cough. When the mucous membrane secretes freely, and the breathing is difficult, the disease is called humoral asthma. The expectoration may be copious or sparing, and of all characters, even purulent; being sometimes inodorous, at others, extremely fetid. It varies in colour and consistence. In severe cases, there is dyspnœa or orthopnœa, and great pulmonic congestion. The pulse is commonly small and feeble, and there is often great prostration of strength, in which case the secretion of the lungs is expectorated with difficulty, and the patient may die suffocated. The sufferings of the patient are often increased by flatulence.

3. BRONCHITIS SENILIS.

SYNONYM.—Catarrhus senilis.

SYMPTOMS.—This, as the name implies, is a disease of advanced age, its symptoms are dyspnœa, wheezing, cough, orthopnœa, abundant mucous expectoration, drowsiness, extreme debility, cold extremities. The patient expires slowly and without suffering, suffocated by the accumulated mucus, which he has no longer strength to expectorate. It generally occurs during several successive winters before it proves fatal.

ANATOMICAL CHARACTERS.—Redness of the tracheal or bronchial mucous membrane to a greater or less extent. This redness is observed most commonly at the termination of the trachea, and in the first divisions of the bronchi. There may be purulent expectoration, though the mucous membrane appears perfectly healthy.

PHYSICAL SIGNS.—Sound on *percussion* clear, or slightly duller than natural. Sonorous and sibilant rhonchi in the first stage, followed by the mucous and submucous rhonchi. These sounds are often heard without applying the ear to the chest. The death *rattles* are caused by an accumulation of mucus in the bronchial tubes.

SEQUELÆ.—The effects of chronic bronchitis are more or less extensive dilatation of one or several bronchial tubes, evidenced by bronchophony; or, where the dilatation is partial and considerable, by pectoriloquy. These sounds are heard, either over the site of the larger bronchial tubes, or in parts of the chest in which such large tubes do not exist.

Another effect of bronchitis is emphysema. The disease may also become converted into pneumonia. Diseases of the heart may follow the long continuance of bronchitis. Dyspepsia is a common accompaniment of the chronic form of the disease. Ascites and anasarca supervene in the last stage of bronchitis.

TREATMENT.—*Of acute bronchitis.* In very acute attacks, occurring in persons previously in strong health, general bloodletting, followed by tartar-emetic in nauseating doses, may be necessary. When the disease is less severe, and the general health is unimpaired, local depletion, followed by counter-irritants to the chest, will be required, and the compound squill pill, alone or in combination with extract of conium, given three or four times a-day. (℞. Pil. Scillæ c. gr. vi. Ext. Conii gr. iv. M. f. pilulæ duæ.) When the cough comes on in fits, a lozenge containing a sixth of a grain of extract of stramonium often proves serviceable. In the bronchitis of children, emetics are very serviceable by promoting expectoration.

In the chronic form of bronchitis, the treatment must be nearly the same as in the milder form of the acute disease, except that local depletion will rarely be required, unless in case of severe exacerbations. The compound squill pill is here an excellent remedy, and it may be advantageously combined with Dover's powder, or the extract of conium. When there is a considerable collection of mucus in the air-tubes, with urgent dyspnœa, an emetic may be given early in the morning, or twice in the week, with the greatest advantage. The chest and body should be kept warm, and the chest itself may be protected by a full-sized emplastrum roborans.

In bronchitis senilis.—When the debility is extreme, and in all cases of *bronchitis senilis*, the appropriate remedy is a combination of stimulants and narcotics. One of the best consists of five or ten grains of sesquicarbonate of ammonia, with five minims of laudanum in an ounce of mistura camphoræ. In extreme cases, still stronger stimulants, with a nourishing diet and a liberal allowance of wine are required. In winter, a fire should be kept in the sitting and bed rooms night and day, and should on no account be allowed to go out. When dropsical effusions supervene, stimulants, diuretics, and expectorants are indicated.

REMEDIES.—*In chronic bronchitis.* Oil of turpentine, balsam of copaiba, lobelia inflata, colchicum, and the inhalation of chlorine, iodine, or tar vapour.

It is important that those who are subject to bronchitis, or who labour under it in the chronic form, should avoid all unnecessary exposure to cold. This is more especially necessary in the bronchitis of old people, which is greatly aggravated by exposure to cold. The rooms which they inhabit should, therefore, be kept warm, and as nearly as possible of a uniform temperature; the chest and extremities should be carefully protected from cold; and they should avoid exposing themselves to cold air. If obliged to leave their rooms during the winter, they should use a respirator, or what answers nearly as well, a folded handkerchief held before the mouth. In many cases, exposure to cold air gives temporary relief, but the symptoms return with renewed severity when the circulation is restored by the warmth of the room.

ASTHMA.

Definition.—Dyspnœa occurring in paroxysms, with intervals of freedom of respiration.

Species.—1. Humoral asthma, bronchorrhœa, or bronchial flux; 2. Congestive asthma, or dry catarrh; 3. Spasmodic asthma.

1. HUMORAL ASTHMA.

Symptoms.—The attack is usually preceded by a sense of fulness about the stomach, lassitude, depression of spirits, drowsiness, and pain in the head. On the approach of evening, a sense of tightness is perceived across the breast, with distressing difficulty of respiration. The difficulty of breathing continues to increase for some length of time; both inspiration and expiration are performed slowly, and with a wheezing noise; the speech becomes difficult and uneasy; cough succeeds, followed by the most anxious difficulty of breathing; the patient is threatened with immediate suffocation, and is obliged instantly to rise from the horizontal position; the face is sometimes turgid, and of a livid hue; at others it is morbidly pale and contracted. These symptoms usually continue till towards the approach of morning, when a copious expectoration of a thin frothy mucus comes on, the breathing becomes less laborious and more full, the patient speaks and coughs with greater ease, and, feeling every way relieved, soon falls asleep. The dyspnœa and tightness across the chest remain for some days after the attack, and for several succeeding evenings an exacerbation occurs similar to that above described.

Anatomical Characters.—Not constant. The mucous membrane is generally free from disease; but some affection of the heart, particularly of the right side, is not uncommon. Miliary tubercles, and extensive disease of the bronchial glands, have been met with in fatal cases.

Physical Signs.—Sound on percussion generally good, but in extreme cases dull. Sonorous and sibilous rhonchi at the commencement of the attack, followed by the mucous, submucous, and subcrepitant rhonchi. Some degree of wheezing and sibilous usually remains after the attack.

CAUSES.—*Predisposing.* Hereditary peculiarity; lax habit of body; long-continued dyspepsia; gout.

Exciting.—Sudden changes of temperature; disorders of the primæ viæ, especially flatulence; certain effluvia, as of hay or ipecacuanha.

DIAGNOSIS.—The pathognomonic symptoms are, paroxysms generally coming on at night, in which there is frequent and extremely anxious respiration; together with a wheezing noise, and sense of tightness across the chest.

PROGNOSIS.—*Favourable.* Youth and unimpaired constitution, and the absence of organic disease.—*Unfavourable.*—Repeated attacks; old age; debility; organic disease.

TREATMENT.—*Indications.* I. To shorten the paroxysms and relieve urgent symptoms. II. To prevent the recurrence of the fits, by removing the predisposing and exciting causes.

I. The first indication may be fulfilled by an emetic at the onset of the attack, but this is inadmissible where there is great debility. In strong and healthy persons, full doses of tartar-emetic, of ipecacuanha, or the lobelia inflata, in the form of tincture, in doses of from twenty to thirty drops, may be given with great advantage. In the debilitated, stimulants are required, such as strong coffee, ammonia, or ether. These may be combined with opium in moderate doses. Heat applied to the extremities, or to the entire surface, by means of the warm or vapour bath, is extremely serviceable, but should be applied at the onset of the attack. Where the fit has already lasted some time, and the expectoration is abundant, provided that at the same time there are no very severe or dangerous symptoms, it is best to leave the patient to himself, as the increased secretion is the best relief to the breathing.

II. The exciting causes must be carefully avoided, the general health must be preserved, and the state of the digestive organs be carefully attended to. The bowels should be kept free, but hypercatharsis must be avoided; liquids should be taken in moderation; the diet should consist of a due mixture of animal and vegetable food, but acescent fruits and such vegetables as occasion flatulence should be taken sparingly. The internal remedies will vary with the state of the system.

I have found alum, in combination with ginger, very serviceable in removing the distressing flatulence which often precedes and accompanies the fit. Ten grains of the one, with five grains of the other, and three or four grains of rhubarb, may be given three or four times a-day. I have also more than once met with tenderness on pressure in the cervical and dorsal regions, and have used tartar-emetic ointment with much benefit. (G.)

2. CONGESTIVE ASTHMA.

This resembles the foregoing variety in coming on in paroxysms of severe dyspnœa, but differs from it in the scanty expectoration which accompanies the cough, and terminates the fit. The physical signs are those belonging to a swollen state of the mucous membrane of the air-tubes—viz., clear sound on percussion, indistinct respiratory murmur, with sibilant rhonchi, or a peculiar click, and, in limited portions of the chest, the mucous rhonchus.

ANATOMICAL CHARACTERS.—A deep red or violet colour of the mucous membrane of the air-tubes, with scanty mucous secretion.

CAUSES.—Dyspepsia, exposure to wet and cold, and organic disease of the heart, leading to obstructed circulation.

PROGNOSIS.—Generally favourable, except where the disease is of long standing, or complicated with other functional or organic derangements.

TREATMENT.—Dry cupping and counter-irritation to the chest, expectorants, as squills, ipecacuanha, or colchicum, in combination with alkalis, the inhalation of steam holding some stimulant in solution, such as tar-vapour, or ammonia. Smoking stramonium is sometimes found advantageous. Strict attention must be paid to the state of the digestive organs, the bowels must be kept free by aloetic purgatives, and the general health must be carefully attended to.

3. SPASMODIC ASTHMA.

This term is applied to dyspnœa occurring in paroxysms, unaccompanied by signs of congestion or inflammation of the bronchial tubes, and presumed to depend on a spasmodic action of the muscular fibres of the air-tubes.

SYMPTOMS.—Sudden and extreme dyspnœa; a feeling of constriction in the chest, as if a cord were bound tightly round it; the countenance suffused, and expressive of intense anxiety and distress; the superficial veins distended; the skin covered with a profuse perspiration. The body is bent forwards, the arms resting on the knees, the shoulders are raised, the abdomen contracted, and all the muscles of respiration are thrown into violent action.

PHYSICAL SIGNS.—Sound on percussion less clear than usual, respiratory murmur very faint, and occasionally accompanied with slight wheezing or whistling. If the patient is desired to hold his breath for a few seconds, or to count until the air in the chest is exhausted, and then to inspire slowly and steadily, the air will be found to enter as usual. The respiratory murmur soon becomes feeble again. The distinctive physical sign, then, of spasmodic asthma, is imperfect respiratory murmur, *except after holding the breath*, when it becomes as loud as, or even louder than, usual. (Williams.)

CAUSES.—*Predisposing.* The same as in other spasmodic diseases; hereditary peculiarity; hysteria.

Exciting.—Attacks of dyspepsia; extreme flatulence; irritation of the upper part of the spinal cord; pressure of tumours on the pulmonary plexus or on the par vagum; peculiar odours, as of hay, the smell of a stable, of ipecacuanha, &c.

PROGNOSIS.—Favourable, in the absence of complications. It is dangerous when combined with other diseases of the lungs, or with those of the heart. It often lays the foundation of emphysema, pulmonary congestion and hæmorrhage, and of dilatation and hypertrophy of the heart.

TREATMENT.—*Indications.* I. To relieve the patient's sufferings during the fit. II. To improve the general health, and give tone to the system during the intervals.

I. When the fit has actually commenced, some relief may be afforded by counter-irritants to the chest, epigastrium, and extremities; by antispasmodics, as æther, opium, belladonna, assafœtida, and valerian; and by strong coffee. This latter remedy has been strongly recommended by Pringle and Laennec. When the patient is aware of the approach of a fit, he may sometimes ward it off by an emetic, or by smoking stramonium or tobacco. Dashing cold water over the face and body will often succeed in preventing a paroxysm. Electricity has been used with the same view. The ascertained causes of the fit must of course be carefully avoided.

II. The state of the digestive organs demands peculiar attention: the diet should be light, wholesome, and easy of digestion; all substances which encourage flatulence should be avoided. The state of the bowels must be carefully attended to. For the improvement of the general health, the shower-bath, or cold sponging, followed by frictions of the chest, should be employed every morning, and tonics should be administered in full doses. The preparations of iron, zinc, silver, or bismuth, are the best. Where much flatulence is present, alum in combination with ginger may be given with advantage. If there is tenderness in any part of the spine, leeches may be applied, or the tartar-emetic ointment, or both. When the spasm of the bronchial tubes is combined with congestion of the mucous membrane, or increased secretion, the treatment must be varied accordingly. Depletion or counter-irritation must be employed with antispasmodic remedies. The same strict attention to the diet, to the state of the bowels, and to the general health, will be required in every form of asthma.

Spasmodic asthma is sometimes confounded with a totally different disease, which has its seat in the external muscles, and is closely allied to chorea and hysteria. It is characterized by extraordinary frequency of the respiration, and by the perfectly healthy sound of the chest and breathing. It is sometimes also a marked symptom of paralysis agitans, the muscles of respiration partaking of the affection of the other muscles. A remarkable case of spasmodic asthma occurred in a female aged twenty-two, who came under my notice several years back as a patient of the Surrey Dispensary. The paroxysms, which were of variable duration, were characterized by extreme frequency of breathing, with comparatively little general disturbance of health, and perfect freedom of respiration. There was amenorrhœa, some tenderness of the upper part of the spine, and constipation. The disease was cured by purgatives judiciously and perseveringly administered. No other remedy was employed. Hypercatharsis was invariably followed by a paroxysm. I have seen a case of the same kind in which there were 140 respirations to 144 pulses. In this case much benefit was derived from cold affusion. (G.)

EMPHYSEMA.

SYMPTOMS.—Permanent shortness of breath, increased to extreme dyspnœa by occasional exciting causes, as exercise, flatulence, or a common cold; and, in extreme cases, by assuming the horizontal posture; with a dusky hue of countenance and cold extremities. Fits of orthopnœa coming on suddenly in the night, and obliging the patient to sit up, and to open the doors and windows of his room for air. These fits are accompanied by severe palpitations of the heart, and blueness of the face and lips. There is usually some cough, with scanty expectoration, which varies in character, consisting, in most cases, of a thin mucus, mixed with small tenacious clots, and filled with air-bubbles. The expectoration is increased by a supervening attack of bronchitis. The general aspect of the body undergoes a change by the long continuance of the malady; the countenance becomes pale, and of a dusky hue, the body is emaciated, and the legs and abdomen swell.

SEQUELÆ.—Hypertrophy of the heart. Fatty degeneration of the liver and kidneys. Anasarca and ascites.

PHYSICAL SIGNS.—Peculiarly clear sound on percussion, with indistinct respiratory murmur; to which is sometimes added, a dry crepitous rhonchus, with occasional loud clicking sound, or a friction sound, similar to that of a finger rubbed on a table. When there are complications, the physical signs of such complications are superadded. In marked cases, the chest is enlarged and rounded in all directions. When the emphysema is confined to one lung, or to a part of one lung, the chest is irregularly enlarged. The respiratory movements are indistinct, and the respiration is abdominal.

ANATOMICAL CHARACTERS.—Enlargement of the air-cells, or rupture of the air-cells into each other, or into the subserous cellular membrane (interlobular emphysema). The lungs increased in volume.

Prognosis.—The disease is not fatal in itself, but dangerous by laying the foundation for other diseases.

Treatment.—I. During the paroxysms. II. During the intervals.

I. *During the paroxysms.*—The fits may be greatly relieved by a combination of opium and diffusible stimulants. From 20 drops to ʒss. of laudanum, with from half a drachm to a drachm of spirits of sulphuric æther may be administered at the onset of the fit. The shoulders should be well raised, the doors and windows should be thrown open, at the same time that the body, and especially the lower extremities, are kept warm. In extreme cases, cupping between the shoulders, or the cautious abstraction of blood from the arm by a small orifice, may become necessary. When the patient has reason to apprehend an attack, an emetic, by emptying the stomach, and removing the existing flatulence, may prevent the paroxysm.

II. *During the intervals.*—The disease does not admit of cure. The treatment is partly that of the complications which may exist with it, and partly consists in a few simple precautions, such as the avoidance of colds by warm clothing and dry feet, the daily use of cold sponging or the shower-bath, regular and moderate meals, aloetic aperients, liquids in small quantity, and the avoidance of the causes of flatulence. If flatulence exist, a combination of alum, rhubarb, and ginger (ten grains of the first, three of the second, and five of the third), taken twice or thrice a-day, or a dinner-pill, containing the same or similar ingredients, taken daily an hour before dinner.

Emphysematous patients suffer most in close moist weather, when the function of the skin is impeded; and least when the weather is open, and the air dry and bracing.

PERTUSSIS—HOOPING-COUGH.

Symptoms.—The disease comes on with slight difficulty of breathing, thirst, quick pulse, hoarseness, cough, and all the symptoms of common catarrh. In the second or in the third week after the attack, it assumes its peculiar and characteristic symptoms. The expiratory motions, peculiar to coughing, are made with more rapidity and violence than usual; and after several of these expirations thus convulsively made, a sudden and full inspiration succeeds, accompanied by a peculiar whoop, from which the disease has obtained its name. When the sonorous inspiration has happened, the convulsive coughing is again renewed, and continues in the same manner as before, till a quantity of mucus is thrown up from the lungs, or the contents of the stomach are evacuated by vomiting, which generally terminates the fit; the patient has then most frequently an interval of perfect freedom from cough, and often expresses a desire for food; but when the attack has been severe, it is succeeded by much fatigue, hurried respiration, and generally by languor and debility. After a longer or shorter continuance of the disease, the paroxysms become less severe, and at length entirely cease. In some instances, however, the disease has been protracted for several months, and even for a year.

CAUSES.—*Predisposing.* The period of childhood. Adults, however, are not wholly exempt.

Exciting.—Specific contagion.

DIAGNOSIS.—It is distinguished from every other disease by the convulsive cough, followed by the peculiar sonorous inspiration above described; and by the fits terminating in vomiting or free expectoration.

PROGNOSIS.—*Favourable.* Moderate and free expectoration; the strength little impaired; the fits neither frequent nor violent; in the interval, the respiration free; the appetite good; the absence of fever; moderate hæmorrhage from the nose.

Unfavourable.—The disease occurring in children under two years of age; in children born of phthisical or asthmatic parents; much fever, with symptoms of pneumonia; very copious or scanty expectoration; great debility; convulsions, or coma.

TREATMENT.—*Indications.* I. To keep up a constant state of nausea, so that the fit may be more promptly finished by vomiting. II. To reduce existing inflammation of the lungs.

1. These two indications may be perfectly fulfilled in a large majority of cases by the same remedy—viz., tartar-emetic in doses sufficiently large to keep up a constant state of nausea. From a twelfth to a sixth of a grain, according to the age of the patient, may be given at short intervals, either alone, or in combination with a grain of hydrargyrum c. cretâ. The bowels must, at the same time, be kept free by gentle aperients, the diet must consist of bland farinaceous substances, and the patient must be carefully guarded from cold, and kept in a pure warm air. No other remedies are required; but when there is extreme restlessness, and the fits are accompanied by great distress, the tartar-emetic may be combined with opium, or the antimonial wine with laudanum. Half an ounce of antimonial wine with a drachm of laudanum, and distilled water in sufficient quantity to make a mixture of ℥iss, will form a very good combination. The dose may be a teaspoonful once, twice, or thrice daily. When the expectoration is brought up with difficulty, an emetic should be given once, twice, or thrice a-week.

2. If there are signs of inflammation in the lungs, the tartar-emetic must be continued in increased doses; one or more leeches may be applied to the chest (the most convenient place is the upper bone of the sternum), followed, if necessary, by counter-irritants, hot water, or mustard poultices to the extremities; and, in fact, the treatment

appropriate to pneumonia. If there is determination of blood to the head, leeches to the temples and cold applications. When the severity of the disease has passed away, change of air is the best restorative. Existing debility must be treated by tonics, of which the best are the preparations of steel.

REMEDIES.—The nauseating remedies, as tartar-emetic, and ipecacuanha, with or without laudanum, tincture or extract of hyoscyamus, syrup of poppies, extract of lettuce, &c.; prussic acid, belladonna, digitalis, musk, camphor, cochineal, oil of amber, cantharides. Counter-irritants.

BRONCHIAL POLYPI.

SYMPTOMS.—After slight hoarseness of the voice and dry cough, or without any premonitory symptoms, repeated expectoration of bright-coloured blood, in considerable quantities, attended with little or no dyspnœa, and no febrile symptoms. After an interval of time (sometimes of several days, or of two or three weeks), white casts of lymph, some hollow, some solid, branched so as to resemble the ramifications of the air-tubes, are found mingled with the blood.

DIAGNOSIS.—This disease has generally occurred in robust, plethoric persons, in the enjoyment of good health, and free from any other symptom of phthisis pulmonalis, except the spitting of blood.

PROGNOSIS.—Favourable. The disease is very apt to recur.

PHYSICAL SIGNS.—Slight mucous râle: the absence of the physical signs and symptoms of phthisis, and of aneurism. The respiration in the greater part of the chest healthy.

TREATMENT.—If the general health does not suffer, and there is no dyspnœa, the treatment should be that of the more favourable cases of hæmoptysis. Active treatment is contraindicated. It will be sufficient to prescribe mild aperients, cooling medicines, the dilute mineral acids, in combination with sedatives, and a regulated diet.

DISEASES OF THE SUBSTANCE OF THE LUNGS.

Pneumonia	Inflammation of the Lungs.
Gangræna Pulmonum	Gangrene of the Lungs.
Hæmoptysis	Spitting of Blood.
Phthisis Pulmonalis	Pulmonary Consumption.

PNEUMONIA—INFLAMMATION OF THE SUBSTANCE OF THE LUNGS.

Synonyms.—Peripneumonia. Pulmonitis. Pneumonitis.

Symptoms.—The disease sometimes sets in with rigors, followed by pyrexia; at others the local symptoms are the first to show themselves. There is high fever, with increased heat of surface, especially on the chest; flushed face; injection of the eyes; headache; frequent, quick, and compressible pulse; thirst; furred tongue; anorexia; weakness; and pain in the head and limbs. The symptoms referable to the chest itself are a diffused, dull pain, deep-seated, rarely acute, unless the disease involves the pleura; a short and dry cough, accompanied at first with scanty mucous expectoration, but after the lapse of one or two days, with a rusty-coloured, viscid sputum; the respiration is frequent and short, rising from 13 or 14 (the probable number in the recumbent posture in health), to 30 and upwards.

In favourable cases, this disease may decline on the third or fourth day; more frequently it is protracted to ten days or a fortnight. In unfavourable cases the symptoms increase on the third or fourth day; the respiration becomes more and more frequent; the sputa of a deeper hue, of a more viscid consistence, and often streaked with blood; the pulse increases in frequency and feebleness; the tongue is dry and covered with a brown fur; the skin hot and pungent to the touch; the debility extreme; delirium and coma come on, with all the symptoms of typhoid fever. In the last stage, the expectoration loses its viscid character, and becomes a thin reddish-brown fluid; the dyspnœa increases; the pulse is small and fluttering; the countenance pallid; the lips livid; the skin covered with a clammy sweat; there is an increasing rattle in the throat; and at length the patient dies exhausted, asphyxiated, or comatose.

Anatomical Characters.—Corresponding to the first stage of the disease, *sanguineous congestion;* to the second, *red hepatisation;* to the third, *yellow hepatisation* or *diffused suppuration.*

Physical Signs.—At the onset, puerile respiration; when the disease is fairly established, and during the stage of congestion, *crepitant rhonchus;* in the stage of hepatisation, absence of respiratory murmur, with bronchial respiration, and bronchophony; in the third stage (that of suppuration), *mucous rhonchus*. Throughout the disease, dulness on percussion, which is most marked during the stage of hepatisation. The parts most commonly affected are the lower lobes of one or both lungs; and the physical signs are most strongly marked at the lateral and posterior parts of the chest. When pneumonia terminates in abscess (vomica), the physical signs are those of tuberculous excavations. (See Phthisis Pulmonalis.)

VARIETIES AND COMPLICATIONS.—Pneumonia may supervene on typhus, small-pox, measles, erysipelas, and scarlatina; when it is often obscure and liable to be overlooked. Great heat of chest, unusual dyspnœa, and sudden aggravation of the symptoms, should lead the practitioner to suspect this complication. The physical signs are nearly the same as in idiopathic pneumonia. It is also apt to attack patients labouring under phthisis, is a frequent concomitant of bronchitis, and comes on occasionally after severe injuries and surgical operations. Sometimes it is combined with pleurisy (pleuro-pneumonia).

CAUSES.—*Remote and predisposing.* Sanguineous temperament, vigorous and plethoric habit, winter and spring seasons, a peculiar state of the atmosphere. Also great debility and privation in the poorer inhabitants of large towns.

Exciting.—All the common causes of inflammation; vicissitudes of temperature, violent exercise of the body, or exertions of the voice; congestion occurring from common causes, or in the course of various febrile diseases; other affections of the lungs, especially tubercular deposits; diseases of the heart.

DIAGNOSIS.—The pathognomonic symptoms are the peculiar rusty tinge of the sputa, the crepitant rhonchus, and the peculiar heat and pungency of the surface of the chest. The history of the case, added to these symptoms, will rarely leave any difficulty. The history will also serve to distinguish idiopathic pneumonia from typhus fever with chest complication.

PROGNOSIS.—*Favourable.* An early and copious mucous expectoration, the small crepitation changing to the distinct mucous râle; spontaneous hæmorrhage from the nose; warm, equable, and free diaphoresis; diarrhœa; the appearance of inflammation on an external part; the urine depositing a sediment; diminished frequency of respiration; this is an extremely favourable symptom, and one which should be carefully looked for; the absence of complication; the disease being of limited extent.

Unfavourable.—The duration of the disease beyond the fourteenth day; violent symptoms of fever and delirium, or those of typhus with low delirium or coma; great drowsiness; no expectoration, or the expectorated matter tinged with blood, or of a dark or black colour; sudden cessation of pain, followed by a change of countenance, and a sinking or irregularity of the pulse; the symptoms indicating suppuration or suffocation; a previously broken constitution; complications;

increasing frequency of respiration; the disease extending to the whole lung or to both lungs; occurring in very young children, or in the aged and debilitated.

TREATMENT.—This must vary with the stage of the disease. *During the first stage*, or that of congestion, and in plethoric and vigorous subjects, the remedies are free bleeding from the arm, to be repeated, if necessary, followed by a brisk purgative of calomel (gr. v. to ℈i.); and tartar-emetic, in half-grain doses, at intervals of one or two hours. The quantity may be increased to a grain, or even more. This medicine may always be advantageously combined with calomel. Half a grain of tartar-emetic, with two of calomel, may be given every one or two hours, with the best effect. This combination, in doses proportioned to the age, is of great efficacy in the pneumonia of infants. In less vigorous subjects, local depletion by leeches or cupping will suffice, and in weakly persons counter-irritants, without general or local abstraction of blood.

In the second stage, or that of hepatisation, local bleeding, by cupping or leeches, with counter-irritation, must be substituted for general bleeding, and calomel and opium given frequently, so as to affect the gums, for the tartar-emetic. If, however, there is high fever, the tartar-emetic may still be continued in combination with the calomel; but if typhoid symptoms have already supervened, stimulants are called for. Of these, the best is ammonia, in combination with camphor.

In the third stage, or that of suppuration, stimulants will be required, such as ammonia, æther, and wine; if the fetid character of the sputa announces the presence of gangrene, still stronger stimulants will be necessary, combined with full doses of opium.

The foregoing remedies must be employed with due regard to the severity of the local disease, as well as of the general symptoms. When bleeding is employed, its effects should be carefully watched. Debility, in the absence of marked typhoid symptoms, does not counter-indicate it, and if the pulse rises under its use, it may be continued with advantage. The diet must be strictly antiphlogistic in the first stage; nourishing and stimulant if typhoid symptoms supervene; nourishing, but not stimulating, during convalescence. The patient's room should be of a moderate and equable temperature (about 60°); the head should be raised as much as the patient's strength will allow, and the posture should be changed from time to time.

If a chronic form of pneumonia continues after the severe symptoms have been removed, a course of mercury so as slightly to affect the system, external counter-irritation, tartar-emetic in small doses, the hydriodate of potash with sarsaparilla, or Plummer's pill, with change of air, regular exercise, and temperate diet, may be resorted to. The patient requires to be closely watched, and the chest should be examined from time to time.

GANGRÆNA PULMONUM—GANGRENE OF THE LUNGS.

Varieties.—1. Diffused. 2. Circumscribed.

Symptoms.—Extreme prostration of strength; a frequent, feeble pulse; expectoration of dingy-green sputa, mixed with blood, and of a peculiarly offensive odour; mucous rhonchus; the symptoms of typhus; and death from exhaustion.

Cause.—Pneumonia occurring in extremely feeble constitutions.

Diagnosis.—The peculiar colour and offensive odour of the sputa.

Prognosis.—Highly unfavourable, especially when the disease involves a large portion of the lungs; more favourable when it is limited in extent. About an eighth of the cases terminate favourably.

Treatment.—Strong stimulants and opium in full doses. (℞: Ammon. sesquicarb. gr. x. Tinct. Opii ♏ xx or ♏ xxx every three or four hours; the effect of the opium being carefully watched), with a liberal allowance of wine or spirits, and nutritious diet, as in gangrene affecting other parts.

HÆMOPTYSIS—SPITTING OF BLOOD.

Symptoms.—The spitting of blood is often preceded by a sense of weight and oppression in the chest, often referred to one spot, with some difficulty of breathing, and dry tickling cough. The pulse is generally frequent, sharp, and compressible. There is a saltish taste in the mouth; the countenance is flushed; and a constant irritation at the top of the larynx, which excites hawking and coughing, followed by bloody expectoration. There are generally slight febrile symptoms. In some cases, the mouth constantly fills with blood, without cough or irritation of the throat.

Physical Signs.—The chest sometimes affords the natural sound on percussion, and there is slight mucous râle; at other times there is dulness on percussion over a limited spot, surrounded by crepitant rhonchus. In the former case, the hæmorrhage is from the bronchial tubes (bronchial hæmorrhage); in the latter, blood is effused into the substance of the lungs (pulmonary apoplexy). In a third class of cases the spitting of blood occurs as a symptom of confirmed phthisis, and the stethoscopic signs are those of a cavity in the lungs.

Causes.—*Predisposing.* A certain age—from the period of puberty to the forty-fifth year; sanguineous temperament; plethora; narrow conformation of the chest; previous attacks of the same disease; hereditary predisposition.

Exciting.—Excessive heat of the atmosphere; violent exercise; the lifting of heavy weights; inordinate exertion of the organs of respiration, as in public speaking, singing, &c.; external violence; tubercles in the lungs; gangrene of the lungs; suppression of usual or habitual evacuations, especially of the menstrual discharge; hypertrophy of the left side of the heart, purpura hæmorrhagica, and purpura nautica.

The most common cause of hæmoptysis is the existence of tubercular matter in the lungs, the hæmoptysis in some cases preceding, in others following, the appearance of the other symptoms of pulmonary consumption. The next in point of frequency is vicarious hæmoptysis, the consequence of amenorrhœa. Less frequent still is hæmoptysis dependent on disease of the heart, or rupture of an aneurism. Least frequent of all is hæmorrhage, accompanied by the formation of so-called bronchial polypi.

Diagnosis.—The blood is brought up by coughing, generally in small quantities, or mouthfuls at a time, of a florid red colour, and preceded by, or mixed with, a little frothy mucus. An abundant sudden discharge of *florid* blood would alone lead us to regard the hæmorrhage as coming directly from the lungs, being poured out either by its own vessels, or in consequence of the rupture of an artery communicating with the air-passages.

From *hæmatemesis.*—The blood thrown up in hæmatemesis is usually in much larger quantity, of a darker colour, more grumous, mixed with other contents of the stomach, and usually unattended with cough.

From *hæmorrhage from the nose, fauces, or gums.*—By careful examination of those parts, and the history of the case.

Prognosis.—As regards the disease itself, the prognosis is generally favourable, when the hæmorrhage is not in very large quantity suddenly poured out. It is also favourable when taking the place of the menses in amenorrhœa. In most other cases in both sexes its occurrence must excite suspicion of the existence of tubercles: in the ascertained absence of tubercles, there would be reason to fear disease of the heart. When the hæmoptysis is preceded or followed by the expectoration of bronchial polypi, the prognosis is also favourable.

Treatment.—*Indications.* I. To remove congestion where that exists. II. To keep the circulation quiet. III. To restore the relaxed vessels to their healthy condition.

I. The first indication is best fulfilled by bleeding from the arm. The circumstances which justify the adoption of this remedy are plethora, a full, frequent, and jerking pulse, great dyspnœa, a flushed countenance, and abundant hæmorrhage. When the countenance and skin are pale, the pulse small and weak, and the respiration little affected, bleeding is not required. Bleeding is also contraindicated when hæmoptysis occurs in the course of an attack of phthisis.

Leeches or cupping may be substituted for general bleeding when the abstraction of blood is less urgently required.

II. Low diet, perfect repose, fresh cool air, cold liquids, or ice taken internally and applied externally, with general laxatives, will fulfil the second indication. The head of the patient should be raised, and he should be forbidden to speak, except in a whisper, and then as little as possible. If after bleeding there is still some febrile action, tartar-emetic, in doses of from one-eighth to one-fourth of a grain, may be given every three or four hours.

III. After existing congestion or febrile symptoms have been removed, or in cases where there has been from the first no congestion or fever, the third indication will be fulfilled by remedies belonging to the class of astringents, such as dilute sulphuric acid, in doses of twenty drops, or the acetate of lead, in doses of from five or six to fifteen grains daily, given with an excess of acetic acid, and combined with tincture of opium or hyoscyamus, and tincture of digitalis. Twenty drops of dilute sulphuric acid, with five of laudanum, and ten of digitalis, three or four times a-day, may be given with advantage; or the acetate of lead, and acetic acid, may be substituted for the dilute sulphuric acid.

Remedies.—Nitrate of potass, in full doses; ipecacuanha (two grains every quarter or half hour, till the hæmorrhage ceases); the same in combination with opium; the ergot of rye; Ruspini's styptic (an alcoholic solution of gallic acid); mercury; tannin, in doses of five grains, three or four times a-day.

PHTHISIS PULMONALIS—PULMONARY CONSUMPTION.

Definition.—Tubercular deposit in the lungs, giving rise to suppuration and hectic fever.

Symptoms.—Tubercular phthisis usually begins with a short, dry cough, occurring, for the most part, on first rising in the morning, and so slight as to become habitual before it excites the attention of the patient. It is sometimes accompanied by slight dyspnœa, increased on exertion, and there is generally some degree of languor, weakness, and emaciation. The patient is soon fatigued, and is easily thrown into a perspiration, or he complains of unusual coldness of the trunk and extremities. Slight dyspeptic symptoms, diarrhœa, and frequent headaches, and a small, frequent, quick pulse, are also among the early symptoms, and, on inquiry, the patient will often recollect that he has formerly spit blood.

After these symptoms have continued for a variable period of several weeks, months, or even years, in consequence of a cold, or some trivial exciting cause, the cough becomes more habitual, and is particularly troublesome during the night; the dyspnœa increases; there are shooting pains in the chest; expectoration takes place, at first of a frothy mucus, which afterwards becomes more viscid and opaque, and is often mixed with small round particles of tubercular matter, with pus, or with streaks of blood; or hæmoptysis occurs in a more marked form, and to a greater extent. A peculiar hoarseness of the voice is present in a certain proportion of the cases.

As the disease advances, the cough and dyspnœa become more urgent, the expectoration more abundant, the emaciation and weakness more considerable, the pulse more frequent; the face flushes towards evening, and hectic fever sets in, followed towards morning by profuse perspiration; the urine is high-coloured, and deposits a pink sediment; the palms of the hands and soles of the feet are affected with burning heat; the tongue, from being white, is now preternaturally clean and red. The appetite now often mends, and generally becomes better than in the first stage of the complaint. Profuse diarrhœa, sometimes tinged with blood; colliquative sweats; extreme emaciation; the falling off of the hair; œdema of the legs; aphthæ in the mouth and throat; hectic fever in its most marked form; and a very feeble, rapid, and often irregular pulse, usher in the fatal termination. Still the appetite often remains entire, and the patient flatters himself with the hopes of speedy recovery, and is often vainly forming distant projects of interest or amusement, when death puts a period to his existence.

ANATOMICAL CHARACTERS.—In the lungs, tubercular matter, in the form of miliary tubercles or granulations scattered through the lungs; or of opaque yellowish-white masses infiltrated into their texture. Cavities, of various size and shape, sometimes found in every part of the lung, but generally confined to the upper lobes, larger and more numerous on the right than on the left side. In the larynx and trachea, ulcerations (in the larynx in one-fifth of his cases, in the trachea in one-third—Louis). In the intestines, also, ulcerations (in five-sixths of Louis' cases). The liver enlarged, and changed in appearance and consistence (the fatty or nutmeg liver). Tubercular deposits in various organs of the body.

PHYSICAL SIGNS.—In the incipient stage, before suppuration sets in, dulness on percussion over the clavicles and in the supra and infra clavicular regions. This dulness is sometimes common to both sides, but generally greater on the one side than on the other. In the majority of cases, the dulness is most marked on the right side. Similar dulness between the scapulæ. The upper part of the chest, in some instances, is obviously contracted, the clavicles being very prominent, the supra-clavicular regions deeply hollowed, the anterior and upper part of the chest flattened, and the shoulders thrust prominently forward. The stethoscopic indications are a roughness in the respiratory murmur; a prolonged expiratory sound; bronchial respiration. heard more distinctly on one side than the other, and most to be depended on as a sign of incipient phthisis when heard towards the point of the shoulder; mucous, sub-mucous, and sibilant rhonchus; a slight click; slight crepitant rhonchus; increased resonance of the voice; in some cases, extremely indistinct respiratory murmur.

In *confirmed* phthisis, the physical signs are less obscure. They consist of a more distinct click or bubbling sound, which is most distinctly heard when the patient coughs or takes a full inspiration; cavernous rhonchus; cavernous respiration; pectoriloquy; amphoric resonance; metallic tinkling; distinct gurgling when the patient coughs; and, in rare cases, equally distinct sound of fluid in motion on succussion. The situation in which these sounds occur, and the limited space which they occupy, will generally serve to distinguish phthisis from other conditions of lung productive of the same or similar sounds. The peculiar distinctness of the heart's beat over the entire chest may be mentioned as a common concomitant of phthisis.

The character of the sputa may be classed with the physical signs. At first they are opaque and muco-purulent, as in bronchitis; they then become purulent, often sink in water, and sometimes contain particles of clotted matter, like softened cheese; in rare instances, distinct portions of pulmonary tissue are spit up; streaks or small clots of blood are often mixed with the expectoration; pus is often expectorated in distinct masses, resembling "irregular balls of flock or wool, of a yellow or greenish colour, sinking and breaking down in water."

COMPLICATIONS.—Bronchitis, pneumonia, pleurisy, followed by adhesions or by pneumothorax. Extensive disease of the liver; inflammation of the peritoneum; anasarca; ulceration of the larynx and trachea; ulceration of the intestines; fistula in ano; head-affections.

DURATION.—The average is about two years. In acute cases, from a few months to one or two years; in chronic cases death often takes place after the lapse of years, and after repeated attacks. In very acute cases, in three weeks or a month.

CAUSES.—*Predisposing.* Hereditary predisposition; the scrofulous diathesis; adult age. The male sex? particular formation of the body, marked by a long neck, prominent shoulders, narrow or deformed chest, long slender fingers, with large ends and filbert nails; thin upper lip; a fine clear skin, delicate complexion, fine hair, varying from light to dark chesnut, light blue or grey eye, with large pupil and long eyelash; or the black hair, dark eye, and sallow complexion; sedentary life; bad air; insufficient and unwholesome food; depressing passions of the mind, as grief, disappointment, anxiety; dissipation and intemperance; profuse evacuations, as diarrhœa, diabetes, fluor albus, menorrhagia, hyperlactation, and all causes of debility.

Exciting.—Foregone attacks of pneumonia, catarrh, asthma, scrofula, syphilis, variola, rubeola. The dust to which certain artificers are exposed, as needle-pointers, stone-cutters, pearl-button makers, millers, &c. Irritating fumes. In Italy, and by a few medical men in our own country, pulmonary consumption is believed to be contagious. The opinion, however, rests on very slender grounds; and the strongest argument in favour of it, namely, the occasional death by consumption of husband and wife, loses its force when it is borne in mind that in the case of a disease which destroys so large a fraction of the whole adult population, such coincidences must not unfrequently occur.

DIAGNOSIS.—The symptoms and physical signs taken together, render the diagnosis of confirmed phthisis easy: some difficulty will be experienced in cases of complication with other chest affections; but no precise rules can be laid down for distinguishing such complications from the uncombined diseases themselves. The history of the case, the symptoms, and the physical signs combined, will rarely leave any doubt. The diagnosis, however, is often difficult in the early or incipient stage.

The following observations may facilitate the distinction. The first onset of phthisis is marked by very slight and very variable symptoms. One patient complains merely of debility; a second, of debility and slight emaciation, for which he can assign no cause; a third, of distressing perspiration on slight exertion; a fourth, of constant pain in the forehead; a fifth, of dyspepsia; a sixth, of muscular pains; a seventh, of diarrhœa; an eighth of hæmoptysis; a ninth, of slight hacking cough, with scanty mucous expectoration in the morning; a tenth, of palpitation; and so on. Another patient has been subject to winter cough, or what he terms asthma, for years, but never suffered so much in previous winters; his cough, for the first time, continues throughout the summer months. A few well-directed inquiries on the part of the medical man will often, and even generally, bring to light some additional symptom actually existing, or present at some former period; but, in spite of the most careful inquiry, the case will often remain obscure, and in very many instances, the physician will be led to stop at the most obvious symptom. and to direct his treatment to its removal; unsuspicious of the lurking disease which is its cause.

The Pulse.—In all these obscure cases, there is one symptom which will stand him in good stead, and serve to arouse his suspicions; and this is the peculiar character of the pulse. This consists—1, in increased frequency; 2, in diminished volume; 3, in increased quickness or sharpness; or 4, in all three combined. In the first place, with regard to increased frequency. I have shown elsewhere,* that in five out of six cases the pulse in phthisis exceeds the highest number (92) observed in *apparently* healthy males of the same mean age. In five out of six cases, therefore, the frequency of pulse taken alone will serve to excite suspicion, occurring as it does in a patient whose health and strength are but slightly impaired, and who is evidently labouring under no acute disease which could account for such increase of frequency. Sometimes this symptom is almost the first to show itself, accompanying the first feelings of weakness and indisposition, and continuing throughout the whole duration of the disease. I have known it as high as 140, where debility was the only marked symptom. On the other hand, cases do occur, though very rarely, in which the pulse is even less frequent than the average in health. [Jan. 1853, P. D, aged 34, a policeman. When 24 years of age had an attack of pneumonia, which confined him to his bed for six weeks. During the attack he spat half a pint of blood mixed with yellow sputa, for several days in succession. When 26 years of age, had an attack of pleurisy, for which he was bled. During the two years that he has been in the police force has always had a cough, and when aged 33, again spat a little blood. Spits large quantities of yellow sputa, but no blood at present. There is dulness on percussion above and below both clavicles, with cavernous respiration, increased expiratory murmur, and pectoriloquy above the right clavicle; increased expiratory murmur and slight crepitus above the left clavicle. Pulse, standing, 64. He is still able to follow his employment. August, 1853. External appearance and symptoms little changed, but the pulse now above 100, in the same posture. Has left his employment.] 2. The diminished volume of the pulse is an almost constant character, and is present even in the exceptional cases presently to be mentioned. 3. The quickness of the pulse—that is to say, the promptitude with which each separate pulse rises beneath the finger, is also even more constant than the increase of frequency, and may exist with a pulse of 70. The pulse of health is exactly the reverse of this, rising slowly, and, as it were, deliberately, beneath the finger ; so also is the infrequent pulse of mere debility. To quickness is superadded smallness of pulse in phthisis, whilst the pulse in health is of moderate fulness. 4. The combination of the three characters of pulse—the frequency, the smallness, and the quickness—should always lead to an examination of the chest ; but the small quick pulse alone is sufficient ground of suspicion. These observations apply only to the male, as the characters here pointed out form a striking contrast to those of the male pulse both in health and disease; whilst, on the contrary, the pulse of the female, even in health, possesses these three characters in a marked degree, and assumes them in most functional and in many organic diseases. The slight effect produced by a change from the erect to the sitting posture will also assist the diagnosis in the male, by distinguishing the debility of phthisis from simple debility due to other causes. Whenever, then, a man presents himself for advice, complaining of debility, or of other obscure symptoms of phthisis, or even of symptoms proper to functional diseases of other organs, and is at the same time obviously free from acute disease, the pulse should be examined, and if, after allowing the patient's agitation to subside, the pulse is either very small and frequent, or very small and quick, or if it combine all these characters of increased frequency, smallness, and quickness, the chest should be examined, and in by far the majority of cases the physical signs will be found to justify the suspicion raised by the pulse. It may be well to observe that, in consequence of the quickness of the pulse (the promptitude with which each beat is performed) the pulse usually seems much less frequent than it is. It should, therefore, be always counted by the watch. (G.)

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* Guy's Hospital Reports, No. ix.

Headache.—Another symptom often present, and already cursorily alluded to, is headache,—pain in the forehead and over the eyes, for which there is no obvious explanation. This symptom alone has often led me to the examination of the chest, and in the majority of instances with the result of confirming my suspicions. (G.)

Palpitation.—A third symptom deserving special notice is palpitation. It is often the very first symptom which engages the patient's attention. (G.)

PROGNOSIS.—*Unfavourable*, as to the ultimate event, but guarded as to the event of an existing attack. When the disease can be distinctly traced to hereditary predisposition—when there is a high degree of hectic fever; great frequency of pulse and respiration; great emaciation and debility; a morbidly clean or fiery-red tongue; fixed pain in the chest; colliquative sweats or diarrhœa; profuse purulent expectoration; œdema of the legs; aphthæ; and stethoscopic indications of extensive and advanced disease, or of the supervention of pneumonia or pleuritis—the prognosis as regards the existing attack will be highly unfavourable.

Favourable.—The disease being limited in extent; not traceable to hereditary predisposition; slight emaciation and debility; pulse and respiration but little increased in frequency; absence of night sweats, or diarrhœa, and of complications: these circumstances justify a favourable prognosis as to the existing attack. In any case, the prognosis should be very guarded, as the patient may survive three, four, or more severe attacks in succession, and the physician may incur censure for the apparent incorrectness of his diagnosis. Where the disease is very limited, ultimate recovery is a possible, though very rare, event. In females, the first attack is more generally fatal than in males.

TREATMENT.—I. Of incipient phthisis. II. Of confirmed phthisis.

I. In *incipient* phthisis, the indications are—(*a*) To promote the absorption of the tuberculous matter; (*b*) To prevent or subdue local inflammation; (*c*) To improve the general health.

(*a*) With a view to promote the absorption of tuberculous matter, two remedies have been recommended—viz., mercury and iodine; the first to be given so as slightly to affect the system; the second, in the form of the hydriodate of potash or of iron. Iodine may also be inhaled with the steam of warm water. There is no sufficient reason for believing that these or any other remedies possess any power of removing tuberculous deposits.

(*b*) Local inflammation may be prevented by guarding against cold and all those causes which excite the circulation. Warm clothing; the avoidance of exposure to wet and cold; a diet consisting chiefly or entirely of vegetable food, to the total exclusion of all stimulants; and a proper attention to the state of all the secretions, will fulfil the first part of this indication. Inflammation, where it already exists, may be subdued by small bleedings repeated at intervals of a few days or a week, by leeches applied over the site of the tubercular deposits, by counter-irritants to the upper parts of the chest, of which the tartar-emetic ointment is the best, and, in certain cases, by small doses of tartar-emetic.

(*c*) The general health may be improved by proper exercise, wholesome diet, regular habits, pure air, change of air, especially to the sea-side, sea voyages, cold sponging, followed by friction every morning, and all the means in common use for this purpose.

II. In *confirmed* phthisis—that is to say, where suppuration has already taken place, the indications are—(*a*) To facilitate the expectoration of the products of suppuration; (*b*) To subdue local inflammation; (*c*) To mitigate distressing symptoms; (*d*) To support the patient's strength.

(*a*) The first indication is fulfilled by emetics. These remedies, however, are not admissible, nor are they of use, in the advanced stages of the disease, where much debility is present. When the patient's strength is little impaired, and the expectoration is abundant, they may be given with the best effect. They should be taken on first rising in the morning, and be followed up by a moderate quantity of warm water or warm camomile-tea. Tartar-emetic in half-grain doses, or ipecacuanha, or sulphate of zinc in doses of a scruple, may be given every morning, or on alternate mornings, or once or twice in the week, according to the strength of the patient. Emetics prove most beneficial where they cause the expectoration of abundant sputa from the lungs; perhaps they are also useful by detaching the tuberculous matter from the walls of the suppurating cavity. Whatever may be the rationale of their action, their beneficial effect is beyond question.

Having made use of this remedy in a large number of cases, I am inclined to restrict its beneficial influence solely to those cases in which there is abundant expectoration. In incipient phthisis, attended with a dry cough, or scanty expectoration, emetics are as useless as they might *à priori* be expected to be. (G.)

(*b*) Local inflammation must be combated by the occasional application of a few leeches over the part affected, and the assiduous use of counter-irritants, of which the tartar-emetic ointment or solution is perhaps the best.

(*c*) The most distressing symptoms are night sweats, cough, febrile flushes, palpitations, sickness, diarrhœa, and hæmoptysis. The *palpitation* may be relieved by digitalis, in doses of from five to ten drops of the tincture; the *cough*, by small doses of opium, by the compound squill pill, in combination with the extract of conium, or by small and repeated doses of the more powerful sedatives. Of these, the best is extract of stramonium, in the dose of the sixth of a grain made into the form of lozenge with extract of liquorice, and sucked frequently in the course of the day and night when the cough is most urgent. The *febrile flushes* are relieved by cold sponging and cooling drinks. The *night sweats* often subside under the use of the mineral acids, as the dilute sulphuric acid, in the dose of twenty drops. This may be combined, when there is much restlessness, with a quarter of a grain of morphia. The distressing *sickness* which sometimes accompanies phthisis, requires the use of dilute hydrocyanic acid, in the dose of three or four drops three times a-day, with a bland farinaceous diet. *Diarrhœa* commonly subsides by strict regulation of the diet, and the prohibition of every form of solid food. If this should not suffice, the common remedies for diarrhœa must be employed. That which answers best, is a combination of a sixth or a fourth of a grain of sulphate of copper with the same quantity of opium. In *hæmoptysis*, the dilute mineral acids (Acidi sulphurici dil. ♏ xx.), or, if these fail, the acetate of lead with an excess of acetic acid, and small doses of opium and digitalis (℞. Plumbi acetat. gr. v. Acidi acetici f. ʒi. Tinct. opii ♏ v. Tinct. digit. ♏ x. Aquæ f ℥i.)

(*d*) The patient's strength will be best supported by nourishing diet, without stimulants. In the last stage of the disease, however, stimulants, such as wine and ammonia, may be administered with advantage.

Remedies.—Cod-liver oil, in doses of a dessert or table-spoonful, three or four times a-day, especially in cases of incipient phthisis. The inhalation of ether, conium, tobacco, stramonium, digitalis, iodine, and chlorine, hydrogen and hydro-carbon, and the vapours of tar. Digitalis and hydrocyanic acid; quinine; tonics and chalybeates; naphtha! The Iceland or Irish moss. Change of air; a sea voyage; uniform temperature! A residence at Undercliff in the Isle of Wight, Torquay, Hastings, and Cork; Rome, Nice, the Cape, Madeira, the West Indies.

In incipient phthisis, it is obvious that a sea voyage; or a change of air and scene, or a change from a low, damp spot, to a dry bracing air, would be as useful as to any other person whose health had suffered impairment from whatever cause. This is probably the extent to which change of climate is beneficial in the early stage of phthisis. As, however, it has lately been shown that, in the East Indies, there is among our troops, as well as among the natives, a remarkable immunity from consumption, a residence in that climate may be reasonably recommended, both to persons labouring under the incipient disease, and to families deeply tainted with scrofula.* The places now usually recommended have not this probability in their favour, and the evidence in support of the change is on a level with that in favour of tar-water, naphtha, frictions to the spine, or dry-cupping to the chest. The fact is, that everything that has ever been recommended, however trivial, has seemed to cure phthisis, simply because patients labouring under phthisis do continually recover from existing attacks, and in rare instances regain perfect health, though pent up in towns, breathing the foul air of crowded workshops, living in unhealthy habitations, and surrounded by every unwholesome influence; exposed, in a word, to the continued action of the predisposing and exciting causes of the disease; whilst, on the other hand, many cases stated to be phthisis are merely sympathetic functional disorders of the lungs, or real diseases of the lungs of a non-tubercular origin. To recommend a change of climate in advanced stages of consumption is as unwise as it is cruel. But in incipient cases, a change may be fairly recommended, if it do not entail great inconvenience. But in all cases it is a choice of evils, which ought to be fairly stated. The benefit is not sufficient to counterbalance a great amount of inconvenience or a large pecuniary sacrifice.* This moderate estimate of the beneficial effect of change of climate is founded upon facts and reasonings which the narrow limits of this work do not permit to be stated. (G.)

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* I leave this passage unaltered, though some facts which have recently come under my notice lead me to speak with more hesitation upon this point. (G.)

Prophylaxis.—Persons who have an hereditary predisposition to phthisis, those who have habitually delicate health, or whose chests, on examination, prove to be unsound, require unusually careful management of their health. During childhood, nourishing and wholesome food, proper exercise, warm clothing, frequent ablution of the skin, pure air within doors, both in day and sleeping rooms, moderate application of the mind, and careful attention to the state of the bowels, are necessary. During youth and manhood such exercises as tend to expand the chest, especially fencing; exercise in the open air, especially horse exercise; sponging the chest every morning with cold water, followed by friction; the moderate employment of the voice in singing or in reading aloud; and careful avoidance of all excesses, bodily or mental, should be insisted on. All unwholesome employments, and all sedentary occupations, should be avoided. If a choice of a foreign country is to be made, the East Indies is, in all probability, the best.

DISEASES OF THE PLEURA.

PLEURITIS . . .	Inflammation of the pleura.
PNEUMOTHORAX . .	Air in the chest.
HYDROTHORAX . .	Water in the chest.

PLEURITIS—INFLAMMATION OF THE PLEURA.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE PLEURISY.

SYMPTOMS.—This disease is generally ushered in with rigors, and the usual symptoms of inflammatory fever, accompanied or followed by a sense of weight in the chest, which in a few hours becomes acute pain, referred to the side, about the level of the nipple, and thence shooting to the sternum, clavicle, or arm-pit. In rare cases it extends over the whole of the affected side. There is a short dry cough, unless the disease is complicated with bronchitis, pneumonia, or phthisis, when the expectoration may have the characteristic properties of those diseases. The countenance is expressive of anxiety; the breathing is short and catching, and performed chiefly by the abdomen; the pain is increased by deep inspiration, or by the act of coughing; it is also increased by lying upon the affected side. The pulse is frequent, hard, and contracted, vibrating under the finger like the tense string of a musical instrument. The tongue is covered with a white fur; the urine is scanty and high coloured; the skin hot, and the cheeks flushed.

These are the symptoms of acute pleurisy, in their marked form, and at the onset of the disease. Sometimes, however, severe and extensive inflammation of the pleura occurs without these well-marked characters. The pain may be more diffuse, less severe, or produced only by pressure between the ribs of the affected side, and in some instances it is altogether absent. In most cases, the acute pain, as well as the fever, subside on the third or fourth day, and the cough and dyspnœa abate, though the pleura is still in a state of inflammation.

TERMINATIONS.—In resolution; in adhesion; in effusion; in the chronic form.

ANATOMICAL CHARACTERS.—Injection of the subserous cellular membrane with dryness of the surface of the pleura; effusion of coagulable lymph, or of pus mixed with flakes of lymph; and recent adhesions.

PHYSICAL SIGNS.—When the disease is recent, the effusion scanty, and the surface of the pleura not adherent, there are feeble respiratory murmur from diminished motion of the chest, dulness on striking the pleximeter lightly and quickly with the fingers, friction sounds accompanying the movements of respiration, cessation of vocal fremitus, and ægophony. If adhesion takes place, the friction sounds cease; and if effusion occurs to a considerable extent, the physical sounds are those stated under Empyema. (See Empyema.)

CAUSES.—*Predisposing.* The general predisposing causes of inflammation.

Exciting.—Cold; external injuries, fractures of the ribs, &c.; febrile states of the system; inflammation of the adjoining textures; tubercles in the lung.

DIAGNOSIS.—From *pleurodyne*, by the presence of severe constitutional symptoms, and of the characteristic physical signs. From other diseases of the chest, by the appropriate physical signs.

PROGNOSIS.—*Favourable.* A recent attack met by prompt treatment; the absence of complications; if the disease is not recent, the absence of hectic, and of great debility.

Unfavourable.—Rapid and extensive effusion; the disease existing on both sides of the chest; the coexistence of organic disease; hectic fever and great debility; dropsical effusion.

TREATMENT.—In the acute form of the disease, the *indication* is to reduce the local inflammation and prevent effusion.

This indication is fulfilled by a full bleeding from the arm to the approach of syncope, and the entire relief of the pain and breathing, followed immediately by full doses (from a quarter to half a grain, or even more), of tartar-emetic, every one, two, or three hours, brisk aperients, and a strict antiphlogistic diet. The bleeding will rarely require to be repeated; but if the symptoms indicate it, it should not be delayed. It is of little use after the first few days. For slighter degrees of inflammation, cupping and leeches may be prescribed. The tartar-emetic may be usefully combined with calomel. The tartar-emetic keeps up the effect of the bleeding, until the calomel, slightly affecting the system, entirely puts a stop to the inflammatory tendency.

2. CHRONIC PLEURISY.

SYMPTOMS.—Chronic pleurisy is generally a consequence of the acute form, but it occasionally begins as a subacute or chronic disease. In either case, hectic or remittent fever, a permanently accelerated pulse, emaciation, dyspnœa increased by exertion, and inability to lie on the healthy side, are the principal symptoms. These are apt to alternate with symptoms of the more acute form, such as severe pain, and increased hardness of the pulse.

ANATOMICAL CHARACTERS.—Effusions of various kinds in the sac of the pleura; coagulable lymph thrown out on the surface of the membrane, and in various stages of organization; recent adhesions.

TREATMENT.—*Indications.* I. To promote the absorption of the effused matter. II. To support the patient's strength.

I. The first indication may be fulfilled by mercury, carried to the extent of affecting the system, or by the continued administration of the hydriodate of potash, aided by such local measures of depletion or counter-irritation as may be necessary to prevent the re-establishment of inflammation. Cupping, or leeches, with blisters to the affected side, or the tartar-emetic ointment, will fulfil this indication.

II. The general strength may be supported by the cautious use of tonics; and in cases of great debility, or where the disease has supervened on fever or erysipelas, by the use of stimulants and a nourishing diet.

These measures will often lead to the absorption of the effused matter; but where this is very considerable, and especially when it consists chiefly or wholly of purulent matter, absorption rarely takes place, and the disease now takes the name of *empyema.*

EMPYEMA.

This term is applied to a collection of pus in the cavity of the pleura; but the meaning may be extended, without impropriety, to any collection of fluid, the result of previous inflammation of the pleura. The general symptoms are those of chronic pleurisy; and the physical signs those of effusion of liquid, whatever may be its nature. When the effusion is purulent, ulceration is apt to occur in some of the surrounding textures, and an opening is formed into the lungs, through the walls of the chest, or through the diaphragm. The bones may also become carious in consequence of the pressure to which they are subject. When the matter points externally, fluctuation is perceived in the part, and the integument becomes tense during expiration. When an opening takes place into the lungs, a large quantity of matter is discharged during a fit of coughing, and this is followed by great relief to the respiration. If the opening takes place externally, the discharge of matter is increased by strong expiration, as in coughing. It is often advisable to anticipate nature in affording this relief by resorting to an operation.

PHYSICAL SIGNS.—Enlargement of the diseased side, proportioned to the extent of the effusion, the ribs raised as in a deep inspiration; the intercostal spaces protruded, so as to be on a level with the ribs; sometimes perceptible fluctuation in the intercostal spaces; when the effusion is very considerable, universal dulness on percussion in all postures, with absence of respiratory murmur; when in less quantity, the dulness on percussion, and the respiratory and vocal sounds shifting with the position of the body, and the consequent pressure to which the lungs are exposed. In extreme cases, the heart is displaced so as to beat on the right side. Puerile respiration on the sound side, proportioned in intensity to the degree of compression on the lung of the diseased side. When the effusion is not very considerable, ægophony, which is generally most distinctly heard about the angle of the scapula.

Paracentesis Thoracis.—This operation must be performed with care and due precaution. It should not be delayed too long, as the structure of the lung will, in that case, become so condensed as not to admit of expansion during respiration. If the matter should point in any part of the chest, that part is to be preferred for the opening; but if not, the trocar should be introduced somewhere between the third and seventh ribs, and at the side where the intercostal spaces are widest. The grooved needle should be first introduced, and if there is evidence of fluid in the pleura, the trocar should be cautiously inserted, the skin having been previously drawn upwards, so that the external and internal opening may not correspond. The object is to avoid the introduction of air during the operation: to insure this more effectually, it has been recommended to introduce the trocar under water. The matter must not be withdrawn all at once, but by repeated operations. Pressure by means of a bandage may be advantageously employed both during and after the operation. For more minute details, consult works on surgery.

The discharge of the effused fluid, whether brought about by internal remedies or by operation, cannot take place without more or less affecting the shape of the chest; for in by far the majority of cases, and in all cases where the effusion has been very considerable, the lung is either permanently condensed by the pressure, or bound down by firm adhesions. As the fluid, then, is absorbed, the walls of the chest must fall in, and this shrinking of the diseased side may be ascertained by measurement. The depression first shows itself in the upper part of the chest, but, as the absorption proceeds, extends to the whole of the affected side. The shoulder falls, and remains more fixed than that of the sound side, the ribs are closer together, the scapula approaches the spine and is more prominent, the spine itself is often concave towards the same side: the contents of the abdomen, too, are pressed up into the affected side, whilst the lung of the sound side, expanding beyond its usual limits, displaces the mediastinum and the heart. These changes are accompanied by appropriate physical signs of condensed lung, namely, dulness on percussion, impaired respiratory murmur, bronchophony, and vocal fremitus. When the effusion is partial and confined by adhesions, the contraction will also be partial, and the physical signs more limited in their extent. Pleurisy may occur in young people, and lead to great deformity, without much impeding the function of respiration; but when it attacks the adult, it generally leaves behind it some dyspnœa, with a strong tendency to a recurrence of the disease.

PNEUMOTHORAX—AIR IN THE CHEST.

Air may find its way into the cavity of the pleura in two ways: 1. By communication with the external air, through an opening into the lungs, or through the parietes of the chest. 2. By secretion. The first is the more common cause.

Symptoms.—These vary with the direction in which the opening takes place, and with the previous condition of the pleura. When, in consequence of a superficial ulceration of the lung an opening takes place into a previously healthy pleural sac, the entrance of air gives rise to dyspnœa, acute pain, dry cough, spasms of the intercostal muscles, a frequent, feeble, and sometimes irregular pulse. These symptoms, which take place more or less suddenly, according to the size of the opening, are soon followed by those of inflammation of the pleura. When inflammation already exists, the presence of air not only tends to increase it, but converts the otherwise inodorous pus into a highly offensive discharge.

Physical Signs.—Unusually clear tympanitic sound on percussion, with great indistinctness or total absence of respiratory murmur on the affected side, with increased distinctness of the respiratory murmur on the sound side; and *metallic tinkling,* or *amphoric resonance.* When there is liquid as well as air in the sac of the pleura, the physical signs are, dulness on percussion as high as the level of the fluid, that level shifting with change of posture; metallic *ringing* heard after coughing, on *succussion,* and on sudden motion.

Prognosis.—Generally unfavourable. In some instances, life is prolonged for many months.

Treatment.—This depends upon the stage of the disease, and the state of the patient. The sudden rupture of the lung is generally followed by symptoms of collapse and irritation, which may require stimulants and opium; when inflammatory symptoms come on, antiphlogistic measures must be prescribed, proportioned to the severity of the symptoms and the patient's strength. General bloodletting will rarely be admissible; we must, therefore, resort to local depletion by cupping or leeches, and counter-irritation. Tartar-emetic may be given in nauseating doses, and the bowels should be kept free by gentle aperients. When extreme dyspnœa is present, an opening must be made to give exit to the air, and this should be done at a part of the chest below the level of any liquid which it may contain. The operation may be repeated if necessary.

HYDROTHORAX—WATER IN THE CHEST.

This term is used to designate an effusion of *serum* into the sac of the pleura, empyema being employed to distinguish effusions approaching in consistence to the character of pus, and the result of pleuritis.

SYMPTOMS.—In most cases, the first symptom which shows itself is œdema of the lower eyelids, followed by swelling of the feet and ankles. This is soon followed by dyspnœa, increased upon exertion; and most considerable during the night, when the body is in the horizontal posture. There is a distressing sense of weight and oppression at the chest; the countenance is pale; sometimes, however, it has the asthmatic purple tinge, and wears a peculiar and striking expression of anxiety; the urine is scanty; and there is great thirst. The pulse is irregular, often intermitting for two, sometimes for three strokes; there is palpitation of the heart, sometimes so great as to be both seen and heard, and cough, with expectoration generally tinged with blood. In describing his sensations, the patient frequently speaks of breathing through water. There is great difficulty in lying on the side opposite to the one affected; but when the disease exists in both cavities of the chest, the patient is incapable of lying down at all, and is obliged to be supported by pillows in an erect position. His sleep is disturbed by dreadful dreams of fire, of drowning, of falling down precipices, &c.; and frequently he awakes with a sense of suffocation, suddenly starts from his bed, rushes to the open window for air, and is some time before he recovers his recollection. Anasarca of the upper extremities is a common concomitant, and the arm of the side in which the water is collected is generally cold and torpid, and often affected with numbness.

PHYSICAL SIGNS.—For these, see Empyema.

CAUSES.—Organic disease of the heart, extensive chronic disease of the lungs, causing a mechanical impediment to the circulation of the blood. The disease is probably never idiopathic; when inflammation of the pleura exists, it leads to the effusion, not of pure serum, but of mixtures of serum and coagulable lymph, or of pus.

PROGNOSIS.—Very unfavourable, as it indicates increasing severity of the organic disease which has given rise to it, and is in itself a formidable complication.

TREATMENT.—*Indications.* I. To reduce any existing inflammation. II. To promote the absorption of the effused fluid.

The first indication may be fulfilled by local depletion, by cupping or leeches, by counter-irritants, and by small doses of tartar-emetic. The second indication requires hydragogue cathartics, as the compound jalap powder, or elaterium; or diuretics, as digitalis, squills, acetate of potash, spiritus ætheris nitrici, infusum scopariæ, &c. The choice of these remedies must depend upon the patient's strength and state of health. If great debility is present, diuretics are preferable to drastic purgatives, and if the debility be extreme, the stimulant diuretics should be preferred. An operation is less likely to be attended with benefit in hydrothorax than in empyema, but it may be resorted to when the urgency of the symptoms requires it.

CHAPTER IV.

DISEASES OF THE PRIMÆ VIÆ, ORGANS OF DIGESTION, AND CHYLOPOIETIC VISCERA.

1. Diseases of the Mouth, Fauces, and Gullet.
2. Diseases of the Stomach.
3. Diseases of the Intestines.
4. Diseases of the Stomach and Intestines.
5. Diseases of the Liver, Pancreas, and Spleen.
6. Diseases of the Peritoneum.

DISEASES OF THE MOUTH, FAUCES, AND GULLET.

STOMATITIS	Inflammation of the Mouth.
GENGIVITIS	Inflammation of the Gums.
GLOSSITIS	Inflammation of the Tongue.
TONSILLITIS	Inflammation of the Tonsils.
PAROTITIS	Inflammation of the Parotid gland.
CYNANCHE THYROIDEA	Bronchocele.

STOMATITIS—INFLAMMATION OF THE MOUTH.

SPECIES.—1. Stomatitis erythematosa; 2. Stomatitis membranosa; 3. Stomatitis folliculosa (aphthæ); 4. Stomatitis ulcerosa; 5. Stomatitis mercurialis; 6. Stomatitis gangrenosa.

1. ERYTHEMATOUS STOMATITIS.

SYMPTOMS.—The congested state of the lining membrane of the mouth in new-born infants disposes it to become the seat of erythematous stomatitis, which is generally characterized by redness and heat, and sometimes by dryness of the mouth and tongue. It often coexists with inflammation of the stomach and bowels, and is rarely accompanied by fever in very young infants, though this symptom is common to infants from the seventh to the ninth month. This inflammation may be confined to a part, or extend to the whole mouth, and even to the lips, which swell, excoriate, and sometimes become the seat of *herpes labialis*. When the disease persists for a long time, it often causes profuse salivation, especially in infants under the seventh month.

Treatment.—Simple erythematous stomatitis readily yields to emollient applications to the mouth, and a milk diet; and when it is complicated with inflammation of the stomach and bowels (gastro-enteritis), it yields to the remedies which remove that inflammation.

2. STOMATITIS MEMBRANOSA.—MEMBRANOUS STOMATITIS—MILLET.

Symptoms.—This disease is sometimes confounded with aphthæ, though very easily distinguished from them. The false membrane presents itself in three different forms:—1, as small white points spread over the tongue and inside of the mouth; 2, in the form of larger or smaller patches; 3, in the form of a membrane which covers the entire tongue and inside of the mouth. Sometimes the points or patches are yellow or reddish, which colour is caused by the contact of bile, or of a sanguineous exhalation from the mucous membrane.

When the inflammation of the mouth subsides, the secretion which accompanies it is suspended, and the false membranes are detached or absorbed and disappear. But the inflammation very often advances, the white spots unite and form a large patch, either on the surface of the tongue, lips, or cheeks, or they cover the whole lining of the mouth. These patches thicken, exfoliate, or detach themselves, leaving an inflamed surface beneath.

The disease is most common in infants; it may extend along the whole alimentary canal from the mouth to the anus, and also into the lungs and along all the mucous membranes. The mucous is more tenacious or adhesive than usual, similar to what we observe in chronic bronchitis, or winter cough of aged persons. Infants at the breast are more subject to it than those of a more advanced age. Perhaps there is something in the constitution of very young infants which predisposes them to this modification of inflammation. It is most common to delicate infants who are crowded in the same place, and to those who are improperly fed with artificial food, or deteriorated breast-milk. The disease is more frequent in France than in England, and prevails, more or less, at all seasons. The disease is sometimes seen in adults.

When the disease is mild or partial, there is scarcely any constitutional disturbance; but in the severe forms, there is hot and dry skin, urgent thirst, frequent pulse, and other symptoms of fever. This is particularly the case when the disease extends to the stomach and bowels, or along the mucous membrane of the windpipe to the lungs. When the palate, tonsils, larynx, and trachea are affected, the voice is hoarse, and the cry dull.

Causes.—*Predisposing.* Early infancy; debility.

Exciting.—The congregation of a great number of infants in the same place.

The disease does not appear to be contagious, as MM. Baron and Billard have frequently observed healthy infants drinking from the same cup as the diseased, without contracting the disease.

TREATMENT.—When the disease is simple, distinct, or benign, the mouth should be washed frequently in the day with a piece of lint wetted with gum-water, or with a mucilaginous decoction, containing a fourth part of Labarraque's solution of the chloride of lime. In more severe cases, alum or sulphate of zinc, sweetened with syrup, may be substituted. The bowels must at the same time be regulated by mercurial purgatives. If the disease extend to the bowels, and diarrhœa is present, a strict regulation of the diet according to the age of the patient, with small doses of the pulvis cretæ C. c. opio, should be prescribed.

3. STOMATITIS FOLLICULOSA—APHTHÆ—THRUSH.

SPECIES.—1. Aphtha infantum; 2. Aphtha adultorum.

SYMPTOMS.—An eruption of small white specks, single or confluent, appearing on the tongue, lips, cheeks, gums, uvula, palate, and tonsils. They usually soften in the centre, and discharge a glutinous mucus, which forms a thick whitish crust, adhering at first most tenaciously, and at length falling off without inducing an eschar on the parts beneath. In some cases, the lining membrane of the mouth and throat, and the surface of the tongue, become covered with patches of a loose ragged membrane, hanging from these parts, and of a dull white, greyish, or reddish colour. There is in some cases difficulty of mastication, deglutition, and respiration; and the disease may extend to the œsophagus and stomach, and throughout the whole alimentary canal; in which case, mucus is evacuated in large quantities by vomiting and stool; and at other times, to the trachea and bronchi, when mucus is expelled by coughing. Aphthæ often fall off in the space of ten or twelve hours; more generally they remain for many days, and frequently a separation and reproduction take place several times before the termination of the disease. In severe cases, the ulcers assume a livid colour, and become gangrenous; in others, the surface of the membrane between the ulcers is of a bright-red colour. The disease is most common to children in early infancy, though it may appear at any subsequent period of life. It was formerly considered endemic, and sometimes contagious.

At the commencement of the disease, the infant experiences a disinclination to the breast, and is fretful whenever it is applied. Its appetite is bad, and its motions are depraved, though in some cases there is scarcely any indisposition. In others, there is much feverishness and irritability, the mouth becomes hot and tender, the nipples of the nurse become painful, and sometimes excoriated or chapped, from the contact of the infant's mouth. The disease is slight when confined to the mouth; but when it extends to the œsophagus, stomach, and bowels, there will be frequent vomiting and diarrhœa, followed by irritation and excoriation of the rectum and anus, which become covered with spots like those in the mouth.

Aphthæ sometimes terminate in gangrene, when their edges assume a burnt, torn, and soft appearance; they present a brown eschar, which, when detached, leaves an open granulating surface, of a vermilion colour. The eschar is sometimes covered with a soft pultaceous substance, of a brown colour, and has a marked gangrenous odour. The surrounding parts become swollen, are of a violet colour, and are soft and easily depressed. The mouth of the infant, which is generally open, allows the escape of the saliva; the face is pale; there is great prostration of the vital powers, and an absence of fever. The pulse is extremely feeble; the skin is cold, pale, and insensible. After some time, vomiting, diarrhœa, tumefaction of the abdomen, and sometimes hiccup, supervene.

CAUSES.—*Predisposing.* The period of early infancy; the lymphatic temperament; debility.

Exciting.—Impure air, improper food, disordered bowels, and irritation of the mouth itself.

TREATMENT.—*Indications.* I. To moderate or remove the inflammation, to produce a separation of the aphthæ, and to heal the superficial ulcers. II. To improve the general health.

I. The first indication will be accomplished by frequently washing the mouth with lint or soft sponge, firmly tied to a small piece of wood or whalebone, and dipped in warm water, milk and water, decoction of marsh mallows, linseed, or barley, or any other mild mucilaginous fluid; and also by applying the vapour of such decoctions, or of warm water, to the interior of the mouth.

When the aphthæ remain stationary, and are surrounded by strongly marked inflammatory circles, it may be necessary to apply a leech to each cheek.

If after the inflammation is subdued, the aphthæ remain adherent, stimulant applications must be used to detach them. A good application for this purpose is composed of one drachm of borax, one ounce of honey, and half-a-pint of water, and this should be gently and frequently employed in the manner already mentioned. Others prefer equal parts of honey of roses and barley-water, with a few drops of dilute sulphuric acid. It is often beneficial to touch the ulcerated surface with a fragment of alum, with a view to excite a new action in the parts, and to dispose the inflamed surfaces to cicatrize. If used with caution, it accomplishes the same result as borax and sulphate of zinc, which are much more stimulant. We may also employ a solution of chloride of lime or of soda in a mucilaginous fluid: a drachm of the solution of either chloride may be mixed with a pint of barley-water, and sweetened.

II. The bowels are to be opened with manna, magnesia, or castor oil, and small doses of the hyd. c. cretâ. The diet must be that appropriate to the age of the child, and the nursery must be properly ventilated. The warm bath may be used with great advantage when the child is feverish and restless. Opiates, if administered, should be given with great caution and in small doses. In chronic cases, change of air is highly beneficial.

Gangrene consequent on aphthæ is extremely fatal, as it is accompanied by great prostration of strength. The indications of *treatment* are to support the strength and correct the state of the affected parts. The first indication is fulfilled by aromatic spirit of ammonia, wine, quinine, animal and vegetable jellies: the second, by touching the gangrenous parts with a solution of chloride of lime or soda, or with sulphuric, nitric, or muriatic acid, by means of a capillary glass tube. A mucilaginous fluid, acidulated with one of the chlorides or acids just mentioned, may be applied to the gangrenous parts of the mouth with a fragment of soft sponge, or lint tied on a piece of wood or whalebone. Some advise the application of a solution of alum, others prefer the nitrate of silver, or the fused potass.

The aphthæ of the adult are of most common occurrence in advanced stages of pulmonary consumption, and very rarely constitute an idiopathic disease. The treatment required consists in the exhibition of alteratives, and strict attention to the state of the bowels, with gargles containing the mineral acids, alum, myrrh, or common salt. If these are ineffectual, nitrate of silver or sulphate of copper may be applied in substance.

4. STOMATITIS ULCEROSA—ULCEROUS INFLAMMATION OF THE MOUTH.

Symptoms.—Inflammation of the gum and jaws, of one or both sides, accompanied by swelling, and followed by ulceration at the margin of the teeth; swelling and tension of the cheeks; salivation; fœtor of the breath; redness and heat of the face; injection of the conjunctiva; painful enlargement of the submaxillary glands. The local affection is accompanied by disturbance of the general health, fever, anorexia, and constipation. The ulcers are generally indolent, but occasionally spread till they lay bare the jaw.

Causes.—*Predisposing.* The period between the first and second dentitions; all causes of debility.

Exciting.—Disorder of the stomach and bowels; cold.

Prognosis.—*Favourable*, when the disease is idiopathic. If it follow on fever or scarlatina, *unfavourable*, according to the severity of the primary disease.

Treatment.—I. Local. II. General.

I. The local treatment consists in the use of diluted acids, or of strong solutions of alum, zinc, or nitrate of silver. Tincture of myrrh may also be advantageously employed. In very severe cases, sulphate of copper or nitrate of silver in substance.

II. The constitutional treatment will consist in strict attention to the state of the bowels, the regulation of the diet, and the general health. Aperients, a bland farinaceous diet, and pure air, with quinine or ammonia, if rendered necessary by existing debility. The best aperient will consist of equal proportions of the pulv. rhei, and hyd. c. cretâ, in doses proportioned to the age, followed by castor oil.

4. STOMATITIS MERCURIALIS—MERCURIAL SALIVATION.

SYMPTOMS.—A disagreeable coppery taste in the mouth, looseness of the teeth, and tenderness of the gums, a peculiar fœtor of the breath, with shooting pains in the face, stiffness of the jaw, and swelling of the parotid and submaxillary glands. The gums are at first marked by a distinct red line, and then become generally red and swollen. The inflammation of the gums soon extends to the tongue, which is swollen, indented by the teeth, and furred, and to the interior of the cheeks. There is a constant and profuse discharge of saliva. These local symptoms are accompanied with some degree of fever and general irritation. The inflammation sometimes proceeds to ulceration of the gums and cheeks, and in rare cases, to gangrene.

The duration of mercurial salivation, in slight cases, is two or three days; in severe cases, ten days or a fortnight, and if ulceration or gangrene ensue, still longer. Several weeks often elapse before the gums are restored to their healthy state.

DIAGNOSIS.—In most cases mercurial salivation is distinguished from spontaneous salivation, from the salivation of pregnancy, and from salivation produced by preparations of antimony, copper, arsenic, and gold, by digitalis, prussic acid, and iodide of potassium, and by several other substances, by the peculiar fœtor of the breath.

TREATMENT.—Gargles of alum, zinc, chloride of soda, chloride of lime, tannic acid, hydrochloric acid, or brandy and water. In more severe cases, and when the gums are ulcerated, a strong solution of nitrate of silver (a drachm to an ounce and a half of distilled water), applied by means of a camel's-hair brush, or nitrate of silver, or sulphate of copper in substance. If much swelling of the glands is present, leeches to the jaws, followed by blisters behind the ears, and warm fomentations. If there is much irritation, opium may be given two or three times daily. Saline aperients and free ventilation complete the treatment.

6. STOMATITIS GANGRENOSA—GANGRENE OF THE MOUTH.

SYNONYMS—Gangræna oris; cancer or cancrum oris; water canker; gangrenous erosion of the cheeks; charbon des joues; wasserkrebs; homa.

ANALOGOUS DISEASE.—Gangrene of the vulva.

DEFINITION.—Gangrene of the mouth from internal causes, generally attacking children.

SYMPTOMS.—The attention is often first called to a circumscribed, indolent, hard, shining, swelling on one cheek (generally the left), without pain, heat, or redness. On *examining* the mucous membrane of the mouth, one or more ulcers, blisters, or white eschars will be found on the internal surface of the cheek, lips, or gums. These gradually increase in size, and discharge a dirty sanious fluid, of a highly offensive odour; the saliva is, at the same time, increased in quantity, and flows from the mouth mixed with shreds of the membrane. The swelling of the cheek increases till it involves the eyelids and lips. A dark livid spot now occupies the centre of the swelling, increases in size, softens, and sloughs. Gangrene having set in, makes rapid progress both within the mouth and on the surface, and at length involves the whole of the cheek, lips, and gums, and in extreme cases the nostrils, eyelids, neck, and pharynx; the teeth fall out, and the bones of either or of both jaws, and even the cheek and frontal bones are ultimately attacked. The constitutional symptoms by no means keep pace with the severity of the local affection. In the majority of cases there is no fever, no loss of appetite, and little impairment of strength. The little patient will often continue to run about and play, to sit up, and to amuse himself, till within a short period of his death, the faculties of the mind remaining altogether intact. More rarely the local symptoms are accompanied by fever. Still less frequently the child becomes delirious. Death is ushered in by symptoms of collapse. In cases of recovery, the favourable change is indicated by reaction.

TERMINATIONS.—1. In *recovery*. 2. In partial recovery followed by relapse. 3. In *death* by exhaustion; by starvation from inability to swallow; by hæmorrhage from the separation of sloughs; by the progress of the disease upon which it has supervened; or by complication with hepatisation of the lungs.

COMPLICATIONS.—Pneumonia (58 cases in 63); pleurisy; enteritis; gangrene of the lungs, pharynx, œsophagus, and stomach; gangrene of the extremities, and of the vulva; scrofulous affections.

CAUSES.—*Predisposing*. *Age* from a year and a-half to twelve years; usual limits three to eight years; most common period the third and fourth years; in rare cases as early as fifteen months, one year, three months, or even a few days; also very rarely as late as from fifteen to thirty years; in one instance seventy-two years. The *female sex* (about two females to one male). Improper or insufficient nourishment; the impure air of crowded foundling hospitals and hospitals for children, and of the damp and filthy habitations of the poor; low damp situations, as marshes and the borders of rivers; rainy seasons; the spring and autumn; and all the causes of debility and cachexia.

Exciting.—Continued, remittent, and intermittent fevers; the febrile exanthemata; prolonged gastric irritation; intestinal worms; hooping-cough; pneumonia; congenital syphilis; mercurial preparations in excess, or in children peculiarly susceptible of their action. Contagion? The exanthemata as exciting causes rank in the order of frequency as follows:—Measles, small-pox, scarlatina.

DIAGNOSIS.—From *gangrenous aphthæ*, by these being confined to the secreting follicles of the mucous membrane, by their number, small size, and slow course, and the absence of swelling of the integuments. From *malignant pustule*, by the absence of the febrile symptoms which precede that affection, which is simply a gangrenous affection of the skin unaccompanied by any disease of the mucous membrane. From *anthrax*, by the absence of acute pain and inflammatory symptoms, by the extensive and rapid destruction of parts, and by the coincidence of disease in the mucous membrane. Anthrax is very rare on the cheek. From *scurvy*, by this disease being confined to the gums. In some instances, however, gangrene of the mouth follows on scurvy. From *hospital gangrene*, by the acute pain and severe constitutional disturbance attending that disease. From the several forms of *stomatitis*, by the combination of the affection of the mucous membrane with the gangrene of the integuments. From the effects of *mercury*, by the history of the case; by the swelling of the gums, the abundant flow of saliva, the peculiar odour of the breath, the swelling of the tongue, the numerous superficial ulcerations, the shreds of false membrane, and the falling out of the teeth occurring in severe cases of mercurial salivation. The diagnosis is very difficult when either affection is of some standing, and the previous history is obscure.

PROGNOSIS.—Most unfavourable. Mortality about 75 per cent. In some epidemics every case proved fatal. An early age, previous great exhaustion and treatment postponed till the gangrene has fairly set in are among the unfavourable circumstances.

TREATMENT.—I. Local. II. General.

The *local* treatment consists in the employment of stimulating applications. Previous to the appearance of the livid spot, stimulating embrocations, such as the linamentum camphoræ compositum, or the linimentum ammoniæ, to the cheek. Should gangrene have set in, strong acetic, muriatic, nitric, or sulphuric acid, or the actual cautery, the part having been previously incised. In the intervals chloride of soda or lime in powder sprinkled on the incision. The same or similar applications must be made to the mucous membrane. Before gangrene has set in, it may be sufficient to apply chloride of soda or lime mixed with water to the consistence of a stiff paste, or the muriatic or pyroligneous acid, or lunar caustic. When the parts have become gangrenous, the stronger acids, or the actual cautery, must be substituted. When the eschar has separated, the chloride of soda or lime, or the weaker acids, may be resumed.

The *general* or *constitutional* treatment will depend, in some degree, on the previous history of the case, as well as on the actual condition of the patient. Pure air, scrupulous cleanliness, and nourishing diet, are obviously indicated in all cases. Beef-tea thickened with arrow-root, arrow-root made with milk, calf's-foot jelly, and wine by itself, or diluted with water, or added to nourishing articles of food, should be freely and frequently administered. Quinine in the diluted acids, or in wine, and carbonate of ammonia, in doses proportioned to the age of the child, are the best medicines.

The state of the bowels must be carefully attended to. If constipation is present, the compound rhubarb or compound jalap powder, followed by castor oil or saline aperients, must be given, as often as the state of the bowels may require it. Diarrhœa must be met by the chalk and opium powder, or by other suitable remedies adapted to that disorder, especially injections of starch and opium; pneumonia, if present, must be met by full doses of tartar-emetic, combined with opium.

Remedies.—*Local.* A blister to the cheek. Quinine, camphor, and charcoal in powder. An ointment composed of storax and vegetable charcoal, each one ounce; camphor, myrrh in powder, of each a drachm; oil of turpentine, as much as may be necessary to make an ointment (Richter). Phosphoric acid; creosote; arsenical preparations; acid nitrate of mercury; chloride of antimony; chloride of zinc; leeches. *General.*—Phosphoric acid; lemon-juice; musk; charcoal and camphor; chlorate of potash in scruple doses.

GENGIVITIS—INFLAMMATION OF THE GUMS—PAINFUL DENTITION.

Dentition or teething in infants in perfect health is unproductive of pain or disease. In general, however, infants suffer more or less severely during dentition, from irritation in the stomach and bowels, often followed by diseases of the head and chest.

Symptoms.—Dentition is generally accompanied by an increased flow of saliva, and the gum is red, hot, painful, and swollen. The infant puts its fingers, or whatever it can grasp, into the mouth, and presses its gums upon it, which excites absorption and promotes the cutting of the teeth. Pressure, however, is not borne when true inflammation is present, in which case there is even a reluctance to take the nipple. In some cases there is intense inflammation of the gum, extending to the lining membrane of the mouth, and ulceration, followed by aphthæ, or gangrene.

The general symptoms are feverishness, fretfulness, disturbed sleep, determination of blood to the head, often accompanied by diarrhœa and griping pains in the belly; and inflammation of the brain or its coverings. In extreme cases, water in the head, with convulsions, inflammation of the lungs, or laryngismus stridulus. Skin diseases are also of frequent occurrence, of which the most common are strophulus and lichen.

TREATMENT.—In mild cases, gentle friction of the gums; in more severe cases, scarifications of the gums. The use of the warm bath, the proper regulation of the diet, and a strict attention to the state of the bowels, complete the treatment. The diseases which supervene on teething must be treated on the same principles as the idiopathic affections.

Incision of the gums ought not to be practised unless they are swollen, hot, and painful, in consequence of the pressure of the teeth. When the incision is made prematurely, the appearance of the tooth, so far from being accelerated, is retarded.

The mode of incising the gum deserves attention. The head of the infant is to be held, while the operator opens the mouth and separates the jaws. He then introduces a bistoury, three-fourths of whose edge is covered with lint, and makes an incision parallel to the alveolar margin; and then, separating the jaws still more, he makes another incision transverse to the first. These incisions should be made down to the tooth—the gum ought to be completely divided, and no flap or bridle allowed to remain. This crucial incision disgorges the congestion or inflammation of the gum, and removes the irritation caused by the pressure of the hard tooth on the irritated nerves of the gum. This operation is by no means so painful as is generally imagined. Several local applications to the gums have been recommended, but it is doubtful whether any benefit is derived from their use.

The gums are subject to swelling, ulceration, and gangrene, both in the infant and in the adult. When these affections occur in the adult, they are generally parts of other more general diseases of the system, such as scurvy, or mercurial salivation; in young children, they are more commonly idiopathic.

GLOSSITIS—INFLAMMATION OF THE TONGUE.

SYMPTOMS.—Inflammation of the whole tongue is a rare disease, except as the consequence of profuse salivation, or the application of strong irritants. More commonly it is of limited extent, appearing at first as a hard tumour on the upper surface. This tumour suppurates slowly, and leaves a deep ulcer, which sometimes penetrates the tongue. It owes its origin, in most instances, to derangement of the stomach and bowels, and is cured by purgatives with the local application of nitrate of silver.

Inflammation of the whole tongue is often a severe and dangerous disease, characterized by heat, swelling, and pain, difficult speech and deglutition, dyspnœa, salivation, swelling of the veins of the neck, and determination of blood to the head, with the familiar symptoms of inflammatory fever.

TERMINATIONS.—In resolution, suppuration, or gangrene. In extreme cases, it threatens suffocation or apoplexy.

CAUSES.—Mechanical injuries; strong irritants; the sting of insects; salivation; extension of diseases affecting the tonsils, gums, and cheeks.

TREATMENT.—In the early stage, general and local depletion, according to the severity of the symptoms, with brisk purgatives and other antiphlogistic remedies, and ice to the surface of the tongue. In a more advanced stage, free incisions. When these remedies fail, and suffocation is threatened, tracheotomy must be performed.

Ulceration sometimes takes place on the side of the tongue, from the irritation of a decayed tooth. In this case, the cause of irritation must be removed by filing or removing the tooth.

Scirrhus of the tongue is known by the peculiar hardness of the tumour, the irregular ulceration, the acute lancinating pain, and the cachectic state of the constitution.

Syphilitic ulcerations of the tongue, occupying chiefly its edges, occasionally occur, and require a course of mercury or iodide of potassium, with the local application of sulphate of copper, or nitrate of silver.

TONSILLITIS—INFLAMMATION OF THE TONSILS.

SPECIES—1. Acute; 2. Chronic.

1. ACUTE TONSILLITIS.

SYNONYMS.—Cynanche tonsillaris. Angina tonsillaris. Amygdalitis. Quinsy. Inflammatory sore throat.

SYMPTOMS.—After rigors, followed by flushes of heat, and pains in the back and limbs, and a full, frequent, and compressible pulse, a sense of fulness, heat, and dryness in the throat, pain and difficulty in swallowing, and hoarseness of the voice. The throat itself presents a diffused redness, of a deeper colour over the tonsils, which are swollen, and covered with a viscid mucus; and the tongue is coated with a white creamy fur. As the disease advances, the swelling of the tonsils increases; the act of swallowing becomes more painful and more difficult; liquids return through the nostrils, and there is a constant discharge of viscid saliva; the hoarseness of the voice and the impediment of the speech increase, the respiration is affected, and there is a painful sense of tension, with acute darting pains in the ear. The febrile symptoms increase in severity with the enlargement of the tonsils, and the pain in the back and limbs becomes more acute; but in a more advanced stage of the disease, the febrile symptoms often subside, or they change their character from those of inflammatory fever during the first stage, to those of mild hectic during the stage of suppuration.

DURATION.—From five to seven days.

TERMINATIONS.—By resolution, suppuration, ulceration, or gangrene; or in chronic enlargement.

PROGNOSIS.—The disease may be expected to terminate by resolution when the disease is slight, when the respiration is not much impeded, when the act of swallowing is neither very difficult nor very painful, and when, on examination, the tonsils are not found highly inflamed or much enlarged. Suppuration is to be feared when the disease is prolonged, and does not yield to remedies, when the local pain is acute and throbbing, or when there are rigors or cold shiverings without any evident cause. An abscess is indicated when there is much swelling, a sense of fluctuation on pressure made with the finger, a whiteness of some part of the tumour, and, finally, purulent expectoration. Gangrene is to be dreaded, if the fever is intense, and the pain extremely violent, without any sign of resolution or suppuration. A pinched and sunken countenance, the extremities cold and covered with a clammy perspiration, a small, frequent, weak, and intermittent pulse, and a very fetid odour issuing from the mouth, are signs of its existence.

CAUSES.—*Predisposing.* Childhood, youth, and middle age (it rarely occurs after forty years of age); previous attacks.

Exciting.—Cold; cold drinks while the body is heated or in a state of perspiration; the deglutition of acrid or stimulating substances; long and loud crying, or singing.

TREATMENT.—When the disease is slight, and the symptoms are present, the treatment proper to catarrh (see Catarrh, p. 417.)

When the disease is more severe, it may be necessary at the onset to apply leeches to the throat, to administer brisk aperients, to give nauseating doses of tartar-emetic, and to allow the patient to drink freely of iced-water, or to swallow rough ice. When, however, the disease has made some progress, and suppuration has commenced, the cold water or ice should be omitted; warm poultices should be applied externally, the patient should be directed to inhale the steam of hot water, and to use emollient gargles, and the abscess should be allowed to discharge itself.

If the respiration is much impeded, from the great enlargement of the tonsils, emetics will sometimes cause the abscess to burst, or it may be opened by a lancet or bistoury. In the majority of cases, the tumours subside of themselves, or the abscess discharges itself without requiring any interference.

Remedies.—Stimulant applications to the throat; Pulvis guaiaci given in doses of ʒss every six hours, at the onset of the attack. When the patient is seen at the outset of the attack, before the tonsils have become greatly swollen, or before suppuration has commenced, great benefit may be derived from the repeated application of nitrate of silver, either in substance, or in the form of a strong solution, by means of the camel's-hair brush.

2. CHRONIC TONSILLITIS.

Chronic enlargement and induration of the tonsils often follows an acute attack of tonsillitis. It is also of frequent occurrence in cachectic constitutions, and in the chronic forms of dyspepsia. Sometimes, also, it is prevalent during epidemics of scarlatina.

Symptoms.—Some difficulty in swallowing, hoarse voice, impeded respiration, and deafness commonly attend this enlargement of the tonsils, together with a liability to frequent attacks of more acute inflammation.

Causes.—*Predisposing.* Cachexia, scrofula, and chronic dyspepsia. Straining of the throat in unskilful use of the voice. Clergymen, from want of proper training, and the absence of the freedom acquired by the art of speaking, are very liable to this disease; which is accordingly known as the Clergyman's throat. Singers, making great use of falsetto notes, may also be expected to be liable to these enlargements.

Treatment.—The disease is sometimes removed by improving the general health. When, however, it does not yield to constitutional remedies, and the tonsils are of such a size as to impede deglutition or respiration, or to affect the voice, excision may be practised with advantage. The same remedy is recommended in chronic relaxation of the uvula. The ointment or tincture of iodine may be applied externally with benefit. The best internal applications consist of strong solutions of nitrate of silver, or sulphate of copper, or the tincture of iodine, applied by a camel's-hair pencil, two or three times a-day.

Ulceration of the tonsils may likewise occur in disordered states of health, but it is more commonly one of the secondary effects of syphilis. The disease is generally slow in its progress; but, if not speedily removed, attacks the surrounding textures, extending into the nostrils and fauces, and ultimately attacking the larynx itself.

Syphilitic ulceration of the tonsils is effectually treated by the iodide of potassium given in five-grain doses three or four times a-day. This is to be preferred to the preparations of mercury which were formerly in use. A gargle of the chloride of soda may, at the same time, be used with much advantage, and the ulcers may be frequently touched with nitrate of silver. The general health must be carefully attended to, and the strength must be supported by a nourishing and generous diet. The decoction of sarsaparilla is generally given at the same time with the iodide of potassium.

If the ulcers should continue to spread under the use of the iodide of potassium, a course of mercury may be substituted.

CYNANCHE PAROTIDEA—THE MUMPS.

SYNONYM.—Parotitis.

SYMPTOMS.—After slight febrile symptoms, fulness and soreness at the angle of the jaw, with pain on moving the part. The swelling extends by degrees upwards to the space between the cheek and ear, and downwards to the submaxillary gland, occasioning great deformity. On the fourth day it begins to subside. It generally appears at first on one side, sometimes it attacks the other afterwards; less frequently it attacks both sides at once. The disease is sometimes accompanied towards its decline, or it is followed, by painful swelling of the breasts or testicles. It generally terminates in resolution.

CAUSES.—*Predisposing.* The period of childhood.

Exciting.—Contagion; exposure to cold; scarlatina, and other febrile diseases.

TREATMENT.—Warm fomentations, with the application of flannel in the intervals; gentle aperients, farinaceous diet. If much inflammation is present, leeches may be applied. The secondary affection of the breasts or testicles must be treated in the same way. Should any swelling remain after the inflammation has passed away, friction with stimulating liniments may be prescribed.

Sometimes a metastasis of the inflammation takes place to the brain. In this case, the treatment will be that of idiopathic affections of the brain.

CYNANCHE THYROIDEA—BRONCHOCELE—GOITRE.

Symptoms.—A swelling affecting the entire thyroid gland, or a single lobe of it; at first firm and elastic, but after a time soft, flabby, and containing small portions of a denser consistence. It grows slowly at first, but after a time increases rapidly, extending in all directions, upwards towards the jaw, laterally beyond the limits of the neck, and frequently hanging over the chest. It sometimes attains an enormous size, in which case it may cause serious inconvenience by its pressure on surrounding parts, on the trachea, and on the vessels of the neck.

Anatomical Characters.—The gland is found surrounded with a large quantity of condensed cellular membrane; the gland itself is hypertrophied either partially or through its whole extent, and presents, when cut into, a congeries of cells, varying in size from that of a pea to considerable cavities. These cells contain fluids of various character and consistence.

Causes.—*Predisposing.* Female sex; the age of puberty; hereditary tendency.

Exciting.—Unknown. The disease is endemic in localities differing widely from each other in all respects. But the most common characteristic of the spots in which it prevails, is want of due movement of the air. It is very common in deep valleys shut in by mountains. Combined with idiotcy or imbecility, it is the *Cretinism* of the Vallais.

Treatment.—Iodine in the form of ointment or tincture externally. The iodide of potassium internally, in doses of one or two grains three times a-day. In plethoric subjects, or where there is local inflammation, the previous use of depletion, general or local. Benefit is often derived from the application of leeches. Removal from the district in which the disease originated.

When all other means have failed, and the tumour, by its pressure, occasions great inconvenience, various operations have been recommended. Some have employed setons with benefit. The thyroid arteries have been tied with temporary advantage. The tumour also has been extracted; but the operation is attended with alarming hæmorrhage, and has been followed by fatal consequences.

Remedies.—The burnt sponge, which contains minute quantities of iodine, was formerly in great repute for the cure of this malady.

DISEASES OF THE ŒSOPHAGUS.

ŒSOPHAGITIS—INFLAMMATION OF THE ŒSOPHAGUS.

Symptoms.—Pain, or a sensation of burning, experienced in the act of swallowing, sometimes in a part of the course of the œsophagus, and sometimes through its whole extent. This pain is sometimes increased on pressing the larynx firmly towards the spine. When the inflammation extends to the mucous membrane of the stomach, there is pain in the epigastrium, with vomiting, leading, in some instances, to the expulsion of tenacious casts of the tube. In cases of œsophagitis produced by swallowing hot water or corrosive poisons, large portions of the epithelium are often discharged.

Causes.—Stimulating applications to the tube itself, such as hot water, and the several corrosive poisons. The extension of inflammation from the mouth, fauces, or tonsils; wounds; and mechanical injury from the frequent or unskilful use of the probang.

Treatment.—The appropriate treatment consists in the frequent use of ice or iced-water, and a farinaceous liquid diet. So long as the difficulty of swallowing remains very great, the patient must be supported by nutritious injections.

OTHER DISEASES OF THE ŒSOPHAGUS.

The gullet is subject to other functional and structural diseases, among the former of which may be mentioned rheumatism and spasmodic stricture; among the latter, hypertrophy of the submucous tissue, and various malignant degenerations, such as scirrhus and medullary sarcoma. It may also become subject to pressure from aneurism of the aorta or carotid artery, from enlargement of the cervical glands, and from diseases of the spinal column.

Rheumatism of the gullet is a rare disease, characterized by painful deglutition distinctly referred to some part of its course, accompanied by rheumatism of other muscles, and yielding to the treatment proper to muscular rheumatism.

Spasmodic stricture of the gullet is characterized by difficulty of swallowing, accompanied by a sense of choking in the throat, the food either passing into the stomach after many efforts to swallow, or being rejected. It is generally associated with other symptoms of hysteria, and is amenable to the treatment proper to that disease. It is distinguished from organic stricture by the circumstance of its not being constant, but subject to intermissions; by the result of an examination with a bougie; by the history of the case; and the presence of other hysterical symptoms. It requires no local treatment, but in obstinate cases, the daily introduction of a bougie may be attended with benefit.

DISEASES OF THE STOMACH.

Gastritis . . .	Inflammation of the Stomach.
Dyspepsia . . .	Indigestion.
Gastralgia . .	Pain in the Stomach.
Pyrosis	Water-brash.
Hæmatemesis . .	Vomiting of Blood.
Carcinoma of the Stomach.	
Perforation of the Stomach.	

GASTRITIS—INFLAMMATION OF THE STOMACH.

Species.—1. Acute; 2. Subacute.

1. ACUTE GASTRITIS.

Symptoms.—An acute fixed pain and sense of burning heat in the pit of the stomach, increased by pressure, deglutition, and the movements of respiration; frequent vomiting; attended with an increase of pain; hiccup; sudden and great prostration of strength; a hard, wiry, and rapid pulse, which soon becomes small, irregular, and intermittent; great restlessness; and extreme anxiety; intense thirst and desire for cold drinks; the tongue red at its point and margins, or over its entire surface, and finally becoming parched and glazed.

The disease is rarely confined to the stomach, but extends to the gullet and intestines, being accompanied by pain and difficulty in swallowing, diarrhœa, and extreme tenderness of the abdomen.

Terminations.—*In resolution*, when the pulse becomes more soft and full, and the other symptoms gradually disappear. *In chronic gastritis*:—*In gangrene*, marked by a violent exacerbation of the symptoms, followed by a sudden cessation of pain; a rapid and intermitting pulse; the utmost prostration of strength; cold extremities; delirium; hiccup; death. *In ulceration followed by perforation*, characterized by sudden and acute pain, with extreme prostration, followed by the symptoms of peritonitis.

Causes.—Drinking cold fluids while the body is heated; drinking hot water; acrid or poisonous substances taken into the stomach. Acute gastritis is, in a very large proportion of cases, the immediate effect of irritant poisons. Idiopathic inflammation almost invariably assumes the form of subacute gastritis.

DIAGNOSIS.—From *enteritis*, by the seat of the pain, as ascertained by pressure; by the peculiar sense of burning heat in the epigastric region; by the more severe vomiting and hiccup.

PROGNOSIS.—*Favourable.* The pulse becoming more soft and full, and diminishing in frequency; the pain and tenderness gradually ceasing.

Unfavourable.—The continuance of the disease without any marked alleviation of symptoms. Extreme and general tenderness of the abdomen. Symptoms marking the accession of gangrene, or the occurrence of perforation.

ANATOMICAL CHARACTERS. — The mucous membrane of the stomach universally red, or covered with patches of inflammation, especially around the cardia and pylorus; abrasion, ulceration, or softening of the membrane; gangrene; also dark patches resembling gangrene, but arising from the effusion of blood into the substance of the membrane itself, or into the submucous cellular tissue.

Occasionally the redness follows the course of the blood-vessels, which are injected and arborescent; the colour is of a vivid red or it is black, as if charred. Gangrene is rarely met with; ulceration is also unusual, and seldom penetrates as far as the muscular coat. Softening is a common consequence. When contraction of the stomach accompanies inflammation, the rugæ of the mucous coat are very prominent, and of a deeper tint than the surrounding parts.

TREATMENT.—*Indication.*—I. To reduce the inflammatory action. II. To diminish the irritability of the stomach.

I. The first indication is fulfilled,—

1. By bleeding from the arm, or by the free application of leeches to the pit of the stomach.

2. By iced-water or ice, externally and internally.

3. By keeping the bowels open, in the absence of diarrhœa, with emollient clysters.

4. By the free and frequent use of mucilaginous diluents, such as gruel, linseed-tea, or barley-water, in which gum acacia is dissolved.

II. The sickness, restlessness, and pain may be relieved by small doses of morphia or of hydrocyanic acid.

2. SUBACUTE GASTRITIS.

SYMPTOMS.—Pain in the epigastrium increased by pressure, and *immediately* on taking food, with constant nausea or sickness, the stomach rejecting food *as soon as* it is swallowed, or after a short interval. The tongue is sometimes red at the tip and edges, and furred in the centre; at others, morbidly red over the entire surface; but in many cases perfectly clean. The bowels are generally costive, but sometimes diarrhœa is present, when the disease is called gastro-enteritis. The disease is often accompanied by a dry cough.

Causes.—Constipation; an occasional increase of dyspepsia; unwholesome diet.

Treatment.—A few leeches to the epigastrium in the more severe cases, followed by a blister or mustard poultice. In the less severe forms of the disease, the counter-irritant alone is required. The diet must be carefully restricted to gruel, arrow-root, or sago, made with water or milk, to the entire exclusion of solid food, till the sickness and tenderness on pressure disappear; when the patient should be allowed gradually to resume his usual diet. A mucilaginous mixture with a few drops of tincture of hyoscyamus may be given three times a-day; and the bowels must be kept open by the compound rhubarb or aloetic pill, given every night, or every alternate night, as required. A table-spoonful of castor-oil may be substituted for the pills.

DYSPEPSIA—INDIGESTION.

Symptoms.—Want of appetite; nausea; flatulence; heartburn; occasional pain in the epigastrium; a sense of fulness and oppression after eating, or a feeling of languor and depression relieved by taking food. A furred tongue; languor and aversion to exercise of mind or body; dejection of spirits. The foregoing symptoms, variously combined, and generally accompanied by some disorder in the functions of the bowels, in the form of constipation, diarrhœa, or the two conditions alternately, and with more or less derangement in the functions of the liver, constitute the most common form of dyspepsia. Obstinate vomiting; cold extremities; headache; vertigo; various affections of the senses, as dimness of vision, imperfect or double vision, bright spots before the eyes, or muscæ volitantes, and noises in the ears; palpitation; irregular or intermittent pulse; shooting or fixed pains in the region of the heart, and under the scapulæ, varying with the degree of flatulence, are occasional symptoms of dyspepsia; to which may be added, gastralgia and pyrosis. (See those diseases.)

Causes.—Debility; want of exercise; want of cleanliness; depressing passions; overloading the stomach with food; imperfect mastication; food difficult of digestion; liquids in excess, especially warm drinks, such as tea and coffee; the abuse of spirituous liquors, opium, and tobacco; the frequent use of drastic purgatives; too short or too long an interval between meals; exercise immediately after taking food; diseases of the liver, pancreas, or spleen; the gouty diathesis; tubercular deposits in the lungs. Dyspepsia is a frequent precursor of pulmonary consumption, and a common accompaniment of the several forms of asthma.

DIAGNOSIS.—From *subacute gastritis*, by the pain, if any, not following immediately upon a meal or within a short interval of taking food; and by the absence of pain on pressure over the pit of the stomach.

PROGNOSIS.—*Favourable*, in recent cases; *unfavourable*, in proportion to the time that it has lasted. It is not in itself a fatal disease.

TREATMENT.—*Indications.* I. To correct any bad habits into which the patient may have fallen, and to regulate the diet. II. To restore the tone of the stomach. III. To palliate urgent symptoms.

I. The first and most important step to be taken in the cure of dyspepsia is to point out to the patient the indispensable necessity of changing such habits and pursuits as may have tended to give rise to the disease, and continue to aggravate it: until this has been effected, remedies will be of no avail.

The habits which are most likely to require correction are the following:—Eating too much at one time; eating too often or too seldom; taking too great a variety of food at the same meal; drinking too much liquid before or with the meals; imperfect mastication of food; the habit of resuming bodily or mental occupation directly after eating; indolent and sedentary habits; the neglect of personal cleanliness; (daily ablution of the body with cold water or the shower-bath, followed by friction with a rough towel, or the flesh-brush, or hair-gloves, should be particularly insisted on); the abuse of purgative medicines, that is to say, taking purgatives, not because the bowels require them, but because the patient feels uneasy; the habits of drinking, smoking, chewing tobacco, opium-eating, and drinking tea and coffee in excess. If any particular article of food seem to disagree, it should be carefully avoided. Where there is much flatulence, vegetables and fruit in excess will often be found to increase the disorder. Wine will sometimes require to be exchanged for weak brandy and water, or for brandy with soda-water, or Seltzer water; and common beer for the bitter beer or ale.

II. The second indication is fulfilled by remedies belonging chiefly to the class of tonics; by the bitter infusions, such as the infusions of quassia and gentian, with the aromatic waters; by the mineral waters of Buxton or Selters; by quinine; by the mineral tonics, bismuth, steel, zinc, and nitrate of silver; and by the mineral acids. These remedies, if not incompatible with each other may be given in combination, or they may be combined with aperients. In mild cases of dyspepsia, a dinner-pill consisting of rhubarb, ginger, and capsicum may be given about an hour before dinner with great advantage. The compound rhubarb pill of the Pharmacopœia may be given as a dinner-pill in mild cases of dyspepsia. (℞. Pulv. Rhei, Pulv. zingib., Pulv. Capsici āā ℈ i. Ol. menthæ pip. q. s. Ut fiant pil. xii.)

III. The third indication must be met by remedies appropriate to the several accidental combinations. If there is great acidity, alkalies and the alkaline earths are indicated, as the liquor potassæ, or the carbonate of soda or magnesia; if constipation, aperient medicines regularly administered, so as to relieve the bowels without inducing hypercatharsis; if there is yellowness of the skin, or conjunctiva, or the evacuations are clay-coloured, or there is hæmorrhage from the stomach or bowels, small doses of mercurial preparations; if diarrhœa, a strict regulation of the diet, and, if necessary, the remedies mentioned under that head; if constant sickness, hydrocyanic acid given at short intervals, in doses of three drops of the dilute acid cautiously increased. If the symptoms of subacute gastritis should supervene, the treatment proper to that disease. If gastralgia or pyrosis exist, the remedies recommended under those heads.

It must be obvious that, in many cases, the treatment of dyspepsia must be tentative, and dependent on the combination of symptoms which happens to be present.

GASTRALGIA—PAIN IN THE STOMACH.

Synonyms.—Gastrodynia; cardialgia; neuralgia of the stomach.

Symptoms.—Acute pain in the epigastrium, occurring at a variable interval of from half-an-hour to three hours after a meal, generally relieved by pressure, and by food. It is associated with other symptoms of dyspepsia, and is often terminated by pyrosis.

Diagnosis.—From *subacute gastritis*, by the pain in gastralgia coming on at a considerable interval after taking food, but in subacute gastritis following directly upon the meal or within a few minutes afterwards. By the pain in gastralgia being relieved, or not increased, by pressure, whilst in gastritis it is increased. By vomiting, if it be present, following directly upon the meal, and consisting of ingesta, in gastritis; at an interval, and usually consisting of clear fluid, in gastralgia.

Causes.—The common causes of dyspepsia; strong and sudden mental emotions; flatulence; the abuse of tea, coffee, and warm liquids.

Treatment.—*Indications.* I. To subdue the irritability of the stomach. II. To avoid the occasional causes. III. To improve the general health.

I. The remedies which best answer the first indication, are the salts of the less active minerals, such as the trisnitrate of bismuth, or the sulphate of zinc. Hydrocyanic acid, morphia, henbane, stramonium, and belladonna may also be given with advantage, either alone or in combination with the preparations of bismuth or zinc. The trisnitrate of bismuth, ten grains three times a-day suspended in any mucilaginous mixture, in mild cases, is the best remedy; the stronger sedatives, of which hydrocyanic acid is the best, may be required in the more severe forms of the disease. A combination of trisnitrate of bismuth and hydrocyanic acid (ten grains of the salt of bismuth with three, four, or five drops of the diluted acid) is sometimes extremely beneficial. The tonic infusions are likely to be serviceable when there is reason to believe that there is great relaxation of the mucous membrane of the stomach. Where there is much flatulence, alum, in combination with ginger (five or ten grains of each), may be administered three times a-day. Smoking tobacco or stramonium is often attended with benefit. Creosote and nitrate of silver have been recommended in dyspepsia, but the latter remedy is one which should not be resorted to till other metallic irritants have failed.

In one case, in which there was some tenderness in the upper part of the spine, the tartar-emetic ointment rubbed into the seat of pain cured severe gastralgia, attended with distressing vomiting, after the trisnitrate of bismuth and hydrocyanic acid had failed. (G.)

II. The second indication can only be fulfilled by attending to the patient's history of the effect of different kinds of food and drink upon his symptoms. These effects vary in every case. In one patient, the disease will disappear on leaving off the use of tea, another will derive the same benefit from abstaining from potatoes.

III. The improvement of the general health may be effected by regular living, early rising, cold sponging followed by friction, or the cold bath, and by change of air. The state of the bowels requires careful attention.

PYROSIS—WATER-BRASH.

SYMPTOMS.—The disease usually comes on in the morning or forenoon, when the stomach is empty, or some hours after a meal; and is generally accompanied or preceded by gastralgia. The vomited matters consist of a thin watery fluid, in considerable quantity, sometimes of an acid taste, but often quite insipid. The free discharge of the fluid generally gives relief to the pain, and puts an end to the fit.

CAUSES.—*Predisposing.* It principally attacks persons of middle age.

Exciting.—The common causes of dyspepsia.

Treatment.—That of gastralgia. If the liquor ejected from the stomach be highly acid, the liquor potassæ or the carbonate of soda or magnesia, may be combined with the other remedies (℞. Bismuthi trisnitratis gr x. Acidi Hydrocyanici dil. ♏ iii, Liq. Potassæ ♏ xx, Mucil acaciæ, Syrupi Tolut. āā ʒii, Aquæ ℥ss. M. f. haustus ter die sumendus.) The dose of the acid to be cautiously increased, if necessary.

HÆMATEMESIS—VOMITING OF BLOOD.

Symptoms.—A discharge of dark-coloured grumous blood from the stomach, in a greater or less quantity, often mixed with food, and preceded by a sense of weight and obtuse pain or anxiety in the region of the stomach. The countenance of persons suffering from this disease is sallow, and the conjunctiva of the eyes tinged with yellow.

Causes.—*Predisposing.* The female sex; middle age; intemperance; peculiarity of constitution.

Exciting.—Suppression of habitual evacuations, especially of the menstrual discharge (vicarious hæmatemesis); tumours compressing the liver or spleen; external violence; obstructions in any neighbouring viscus; rupture of a blood-vessel. The fluid is either poured out from the mucous membrane, which is congested, with patches of a red or livid colour; or it regurgitates from the duodenum. Hæmorrhage from the stomach may also be the consequence of the destruction of the coats of the blood-vessels during the progress of malignant disease.

Diagnosis.—From *hæmoptysis*, by the blood being vomited, not coughed; by being mixed with food, and not with sputa; and by being of a dark colour instead of a bright red. In certain rare cases, the diagnosis of these two affections is not easy. The blood of hæmoptysis may come up into the mouth without the effort of coughing, and may seem to be vomited rather than coughed up. It may also be unmixed with sputa; and when discharged from old cavities of the lungs, may have remained long enough in the lungs to lose its bright vermilion hue. But the discharge of a very large quantity, such as a pint, or a quart, of dark grumous blood, even though unmixed with food, may be held to be conclusive of the blood having come from the stomach. When such large quantities are expelled from the lungs, the blood is always of a bright vermilion colour.

Prognosis—Hæmatemesis seldom proves fatal from the loss of blood, though it often occasions great debility. When the hæmorrhage is symptomatic of some other disease, the prognosis must depend on the probability of that disease being cured.

TREATMENT.—In most cases, rest, a bland farinaceous diet, cold liquids, and small doses of blue pill, or of the hydrargyrum c. cretâ to act upon the liver, followed by gentle aperients, are sufficient to cure the disease. A single grain of blue pill, with a quarter of a grain of opium may be given twice or thrice daily, with a dose of some gentle aperient every morning.

When the hæmorrhage is excessive, the patient may be made to drink freely of iced-water, or to swallow rough ice, and pounded ice may be applied to the pit of the stomach.

When the hæmorrhage has ceased, we must endeavour to prevent its recurrence by a course of alteratives and aperients, and a strict attention to the digestion and general health.

When the disease is caused by suppression of the hæmorrhoidal or catamenial flux, leeches should be applied to the anus or vulva, together with other appropriate remedies for those diseases.

When the disease occurs in delicate or scorbutic habits, tonics and quinine, with the mineral acids are indicated.

CARCINOMA, OR CANCER, OF THE STOMACH.

SYMPTOMS.—In the early stage of the disease the symptoms are very obscure. They are either those of dyspepsia, or of subacute gastritis. But, after a longer or shorter interval, during which the patient loses flesh, and obtains little or no relief from his dyspeptic symptoms, a circumscribed tumour is discovered in the epigastrium. At this stage of the disease, the symptoms are generally of a more marked character. The pain is of a burning, gnawing, or lancinating character; and there are nausea; acid or bitter eructations; with constant vomiting of ingesta, of mucus, of blood, or of a dark grumous or sanious matter; constipation; great emaciation, and the hue and expression of countenance indicative of the cancerous diathesis.

MORBID ANATOMY.—The disease may take the form of scirrhus, or of medullary or colloid cancer. But the most common form of the disease is that of scirrhus, and its most common seat the pylorus. The disease is identified by the discovery of the cancer-cells (fig. 5, p. 77) under the microscope. The stomach is generally contracted when the disease occupies the cardiac extremity; greatly expanded and hypertrophied when the pylorus is affected.

DIAGNOSIS.—The only pathognomonic signs are the local tumour and the peculiar complexion of the patient. When the vomited matter resembles soot and water, or dark coffee-grounds, there is also a probability in favour of cancer. In advanced stages of the complaint, the extreme emaciation and the sanious discharges will assist the diagnosis. The disease, also, rarely occurs before forty. The part of the stomach which is affected may be generally inferred from the symptoms. When the cardia is the seat of the disease, the pain and vomiting come on immediately after taking food; when the pylorus is the seat of the disease, these symptoms come on later.

CAUSES.—*Predisposing.* Cancerous diathesis; the male sex.
Exciting.—Long-continued dyspepsia. All causes of inflammation or congestion in the stomach. Depressing passions.

TREATMENT.—A bland and nourishing diet, such as new milk; milk thickened with arrow-root; the stronger soups thickened with arrow-root, jellies, and light farinaceous puddings, and tripe boiled in milk. The food should be taken frequently, and in very small quantities. Nutritive enemata should also be administered once or twice every day; and the skin may be anointed with oil. Leeches, to subdue occasional inflammation; narcotics and sedatives to allay pain; anodyne plasters, fomentations, and embrocations externally; and rest.

PERFORATION OF THE STOMACH.

SYMPTOMS.—Intense pain in the epigastrium occurring suddenly, followed by the symptoms of peritonitis, and proving rapidly fatal.
CAUSES.—*Predisposing.* The female sex: youth. Females from the eighteenth to the twenty-fifth year are very liable to this affection.
Exciting.—Ulceration of the mucous membrane; softening; carcinoma; irritant poisons.
DIAGNOSIS.—The pathognomonic symptoms of perforation of the stomach are sudden and intense pain in the abdomen, followed by the symptoms of peritonitis.
PROGNOSIS.—In the highest degree unfavourable, especially when the perforation takes place after a meal.
TREATMENT.—Full doses of opium, with warm fomentations to the abdomen, and complete abstinence from food, the patient being allowed merely to moisten the mouth from time to time, afford the best chance of recovery. If the inflammation runs high, leeches should be applied to the abdomen, followed by warm fomentations. The lower bowels may be relieved by enemata; but purgatives by the mouth are contraindicated.

DISEASES OF THE INTESTINES.

ENTERITIS	Inflammation of the Intestines.
DIARRHŒA	Looseness of the Bowels.
DYSENTERIA	Dysentery.
MELÆNA	Hæmorrhage from the Bowels.
TORPOR INTESTINORUM	Constipation.
COLICA	Colic.
COLICA PICTONUM	Painters' Colic.
TYMPANITES	Drum Belly.
HÆMORRHOIS	Piles.
TABES MESENTERICA	Abdominal Consumption.
INTUS-SUSCEPTIO	Invagination of the Bowels.

ENTERITIS—INFLAMMATION OF THE INTESTINES.

SYMPTOMS.—Acute pain in the abdomen, increased by pressure, varying in situation with the inflamed part of the intestine, and gradually extending to the whole abdomen; accompanied by swelling and tension. The patient lies on the back, with the knees drawn up, and can scarcely suffer the pressure of the bedclothes. There is obstinate costiveness; nausea and constant vomiting, the matters rejected being generally bilious, and, in some instances, highly offensive, and, in still rarer cases, stercoraceous; highly-coloured urine; pyrexia; frequent, hard, contracted pulse; great prostration of strength.

In fatal cases, the swelling and pain increase; hiccup sets in; the pulse becomes irregular; the extremities grow cold; the skin is bedewed with a cold sweat; the features are pinched and sharpened; and death takes place from exhaustion, preceded by a cessation of pain.

ANATOMICAL CHARACTERS.—The disease consists in inflammation of the peritoneal coat of the intestines, which generally involves the muscular coat and cellular tissue at the same time. The inflammation of the peritoneal coat leads to the effusion of lymph and serum into the peritoneal sac.

TERMINATIONS.—*In resolution,*—known by *gradual* diminution of the symptoms, and a free evacuation of the bowels.

In *gangrene,* marked by a *sudden* cessation of pain and anxiety, the patient becoming calm and collected, while the countenance assumes a livid, and indescribably cadaverous hue.

In *ileus,*—from the formation of false membranes, or the permanent contraction of the intestines.

CAUSES.—Local irritation or obstruction, irritant poisons, incarcerated hernia, colic, ileus, indurated fæces.

Diagnosis.—From *colic*, by the one being accompanied with fever, the other not; by the peculiar pulse above described; by the pain in enteritis being constant and increased by pressure; and in colic, intermittent and alleviated by pressure.

Prognosis.—*Favourable.* Gradual remission of pain and other symptoms; the abdomen becoming less tender to the touch; the pain changing its seat; the belly no longer obstructed, a warm equable sweat, the urine depositing a sediment, the pulse becoming more full and soft, and less frequent.

Unfavourable.—The increase of the symptoms; collapse; a sudden cessation of pain; hiccup and stercoraceous vomiting.

Treatment.—I. General and free bloodletting, followed by the application of leeches in large numbers to the part of the abdomen where the pain is most severe, the bleeding being encouraged by warm fomentations.. Calomel and opium in the dose of two or three grains of the former, with a grain of the latter, repeated at intervals of one, two, or three hours for three or four times in succession, and followed, if the pain and tenderness have subsided, at an interval of one or two hours from the last dose, by a full dose of castor-oil. If the disease is not subdued by this treatment, the calomel and opium should be continued so as to affect the gums. Enemata of warm water or warm gruel should be frequently administered, so as to remove any accumulation of fæces which may exist in the large intestines.

Enteritis may become chronic; and in such case the antimonial ointment or a blister should be repeatedly applied to the abdomen.

When the coats of the stomach and intestines are affected at the same time, the disease is called gastro-enteritis. It is never witnessed, except as the effect of irritant poisons. The symptoms are those of gastritis and enteritis combined.

Inflammation of the mucous membrane of the stomach and intestines, or the so-called English cholera, is a disease confined entirely to the mucous membrane, and not to be confounded with the more severe affection attacking the peritoneal covering of the stomach and bowels.

Remedies.—Tobacco-smoke, or a weak solution of tobacco thrown up into the intestines. The use of strong purgatives—a practice to be strongly reprobated.

DIARRHŒA—LOOSENESS, OR PURGING.

Symptoms.—Frequent discharges by stool, at first of fæces dissolved in mucus, afterwards of pure mucus, in greater or less quantity, accompanied by much griping, flatulence, and a sense of weight and uneasiness in the lower belly, nausea, and vomiting. The pain in the abdomen is sometimes slightly increased by pressure. The tongue is sometimes quite natural in appearance, in other cases slightly furred. In chronic cases there is great emaciation.

CAUSES.—The application of cold to the surface of the body; suppressed perspiration; depressing passions of the mind; the high temperature of the summer and autumn seasons; indigestible food; acid fruits, or ripe fruits in great excess; putrid substances; the abuse of active purgatives; previous constipation; worms; retrocedent gout or rheumatism; phthisis pulmonalis; typhus fever. Diarrhœa is a frequent precursor of Asiatic cholera.

DIAGNOSIS.—From *dysentery*, by being unattended either with inflammation, fever, or tenesmus; and by the absence of blood from the stools.

TREATMENT.—When the diarrhœa is recent, the treatment is extremely simple. If the motions are frequent, scanty, and accompanied by some degree of tenesmus, an ounce of castor-oil, combined with twenty drops of tincture of opium, is indicated. If the discharge from the bowels is abundant, whatever may be its appearance and character, ten grains or a scruple of the pulv. cretæ C. c. opio may be given three times a-day, the patient's diet being restricted to gruel, arrow root, or sago, made with or without milk, to the total exclusion of all solid matter. If the disease should not yield to this simple treatment, in one, two, or three days, it will be necessary to continue the diet, and to administer small doses of hydrargyrum c. cretâ three times a-day, in combination with a few grains of Dover's powder, or of the pulvis cretæ C. c. opio. A single grain of hydrarg. c. cretâ, with from three to five grains of Dover's powder, or ten grains of the pulvis cretæ C. c. opio, is a sufficient dose. In the diarrhœa of children at the breast, from half a grain to a grain of hyd. c. cretâ, with a little sugar, or when the child is restless, with two grains of the pulvis cretæ C. c. opio, will soon effect a cure.

This treatment is applicable to all forms of diarrhœa, with the exception of that which consists in a discharge of an abundant grumous matter, closely resembling coffee-grounds, and probably consisting of blood altered in its appearance and character. For this form of the disease, the remedy usually prescribed is sulphate of copper in the dose of a quarter to half a grain, with from half a grain to a grain of opium every three or four hours. When this has failed, I have employed the nitrate of potash in ten-grain doses with the best effect. (G.)

The diarrhœa which accompanies ulceration of the mucous membrane of the intestines, and which is so distressing a symptom of the advanced stages of phthisis pulmonalis, is often removed by the regulation of the diet, and the administration of small doses of hydrarg. c. cretâ. If these fail, sulphate of copper in doses of one-sixth or one-fourth of a grain, with one-fourth of a grain of opium three or four times a-day, may be given with great advantage.

In diarrhœa from functional disorder of the intestines, the remedies commonly used are unnecessary and often injurious. A bland farinaceous diet in recent cases, and small doses of hyd. c. cretâ, with the pulvis cretæ C. c. opio in chronic ones, form the most simple, the most reasonable, and the most effectual treatment.

If there should be much tenderness of the abdomen on pressure, leeches, followed by warm fomentations, will be necessary; if much griping, starch injections with opium will be useful; if sudden debility and faintness, brandy added to the farinaceous diet.

Remedies.—Chalk, kino, alum, decoction of logwood, simaruba, liquor calcis, the aromatic confection, tannin, and the sulphates of zinc and copper. Dilute sulphuric acid in doses of from half a drachm to a drachm.

DYSENTERIA—DYSENTERY.

Symptoms.—The disease sometimes comes on with cold shiverings, followed by fever; at others, the local affection is first perceived. There are costiveness; flatulence; severe griping pains; fixed pain, with great tenderness in the hypogastrium; frequent inclination to go to stool; tenesmus; dysuria; cramps in the limbs, with a scanty discharge of pure mucus, of mucus mixed with blood, of pure unmixed blood, of pus, or of a putrid sanies, and sometimes of films of false membrane. Masses of indurated fæces are likewise sometimes passed by stool. As the disease advances, it produces great emaciation and debility; a quick and weak pulse; a sense of burning heat, and intolerable bearing down of the rectum. The disease often terminates fatally, with hiccup and symptoms of collapse.

Causes.—*Predisposing.* A high temperature.

Exciting.—A specific contagion? exposure to wet and cold.

Anatomical Characters.—Ulceration of the large intestines, and enlargement of the glands.

Prognosis.—*Favourable.* A gentle diaphoresis; the stools becoming yellow and less frequent; the strength little impaired; sediment in the urine.

Unfavourable.—Violent and distressing tenesmus and tormina; vomiting; hiccup; aphthæ; difficult deglutition; convulsions; cold extremities; delirium; cold and partial sweats; the tongue preternaturally red and dry; the pain suddenly ceasing; great prostration of strength; the motions extremely fetid; petechiæ; involuntary evacuations; intermitting pulse; the disease being complicated with, or supervening upon, others, such as affections of the liver and intermittent fever.

TREATMENT.—If there is much fever, general bloodletting may be required; in less severe cases, leeches to the tender spots of the abdomen, followed by warm fomentations. Opium in the solid form, or in the shape of Dover's powder, combined with small doses of calomel, blue pill, or hydrarg. c. cretâ to act upon the liver, may be given in full doses every one, two, or three hours, according to the severity of the symptoms, and followed at intervals by an ounce of castor-oil. Two or three ounces of starch, with half a drachm of laudanum, or a suppository of one or two grains of opium may, at the same time, be introduced into the rectum. The strength should be supported by light preparations of barley, rice, sago, arrow-root, flour, panada, and gelatinous broth.

Neither general nor local bloodletting is required in this country, except in very rare cases; a full dose of castor-oil, with ten or twenty drops of laudanum, and a careful regulation of the diet, being generally sufficient.

The means above mentioned will be found totally inadequate to the cure of chronic dysentery; if a dusky sallow hue of countenance, tenderness upon pressure in the region of the liver, and a clayey appearance of what fæces happen occasionally to be voided, manifest the presence of a diseased and obstructed state of the liver. In such cases *mercury* is the only remedy; and this should be pushed to such an extent as to keep up a gentle affection of the mouth until the symptoms begin to yield.

REMEDIES.—Emetics; acetate of lead with opium; ipecacuanha in small and repeated doses; injections of iced water; assafœtida, turpentine, or tobacco enemata; balsam of copaiba; decoction of cusparia, combined with nitric acid and laudanum; leeches to the anus; strychnine; sulphate of copper, with or without opium. In chronic cases, tonics and astringents; decoction of logwood; a decoction of the pomegranate; tannin, &c.

MELÆNA—HÆMORRHAGE FROM THE BOWELS.

This disease consists in the discharge of dark-coloured blood from the bowels. It commonly occurs in persons subject to chronic dyspeptic complaints, and especially to disorders of the liver. Like hæmatemesis, it attacks those of a cachectic habit. It may occur alone, or in combination with hæmatemesis. It is also, in rare cases, combined with diarrhœa. It is seldom attended with pain, or with severe constitutional symptoms.

Diagnosis.—From *hæmorrhoids* by the darker colour of the blood, by the absence of soreness and tenesmus, and generally by the more abundant flow of blood.

Treatment.—That of hæmatemesis; namely, small doses of the hydrarg. c. cretâ, or of blue pill, with opium, or Dover's powder (Hyd. c. cretâ, or pil. hydrarg. gr. i., Pulv. opii gr. ¼, three times a-day), with an occasional dose of castor-oil in the morning. A bland or mucilaginous diet should at the same time be prescribed. For the treatment of an allied disease—viz., diarrhœa with dark coffee-ground evacuations, see Diarrhœa.

TORPOR INTESTINORUM—CONSTIPATION.

The causes of constipation are either structural or functional.

The *structural* causes either narrow the intestines or entirely obliterate the passage. In the one case, purgative medicines act, though with difficulty; in the other case, the mechanical impediment must be first removed.

Among the *functional* causes of constipation, are the absence of irritating matter from the diet, a deficiency of bile, want of proper exercise, spasmodic action of the muscular fibre, or paralysis of some part of the gut.

The *treatment* of constipation, depending on alterations of function, will depend upon the character of that alteration. If the food is deficient in indigestible matter, we must supply it by brown bread or ripe fruits; if the bile is wanting, we must stimulate the secretions of the liver by mercurial preparations in small doses; if the habits are sedentary, we must enjoin proper exercise. The other functional disorders will be noticed under the head of Colic.

Habitual constipation is best treated by aloetic purgatives; by the compound rhubarb pill, with small doses of the extract of conium; by jalapine, or by such combinations of aperients as shall be found to agree best with the patient. Where the torpor of the bowels is still greater, and especially where there is a large accumulation of hardened fæces, purgative enemata are required, consisting of gruel with castor-oil, or oil of turpentine, Epsom salts and infusion of senna, &c. If the enemata should return without bringing any scybalous matter away, a large quantity of warm water, or of air, should be injected through a long flexible tube introduced into the sigmoid flexure of the colon, as recommended by Dr. O'Beirne.

A stream of cold water poured from a height on the abdomen has sometimes relieved obstinate constipation. When the stomach is irritable, croton-oil may be rubbed into the skin of the abdomen or inside of the thigh.

The management of constipation alternating with diarrhœa requires some care. Whenever diarrhœa is present, purgatives should be at once omitted, and they should not be resumed till it has ceased. This caution is especially necessary in nervous or other diseases, of which constipation is the cause, for these diseases are as much relieved by gentle aperients as they are increased by hypercatharsis.

In obstinate constipation careful inquiry should be made after mechanical obstructions, such as hernia, or intus-susceptio.

COLICA—COLIC.

SYMPTOMS.—Severe pain in the abdomen, with *retraction of the* umbilicus, with a peculiar sense of twisting, occurring in paroxysms, and relieved by pressure; obstinate costiveness; flatulence; nausea and vomiting; with a pulse little increased in frequency.

These symptoms may subside after the operation of a purgative, or they may continue to increase in severity, the pain becoming more fixed, and increased by pressure, the constipation more obstinate, the vomiting more urgent, the matters discharged sometimes consisting of bile, and more rarely of stercoraceous matter. Symptoms of local inflammation follow, and these, if not subdued, generally terminate in gangrene, indicated by the subsidence of the pain, frequent hiccup, prostration, cold sweats, and the facies Hippocratica. These are the symptoms of ileus or the iliac passion.

CAUSES.—Among the causes of the less severe and fatal forms of colic, may be mentioned, cold applied to the surface of the body, especially to the lower extremities and abdomen; austere, acrid, or indigestible aliment; redundance of acrid bile; collections of indurated fæces, or of calcareous concretions, in the alimentary canal; flatus; certain metallic poisons, as lead; hysteria; translation of gout; the imprudent use of astringents in diarrhœa and dysentery; worms; all these increased by a constitutional irritability of the intestines.

ANATOMICAL CHARACTERS.—Death rarely takes place from simple colic. The intestines, if free from mechanical obstruction and consequent inflammation, are found firmly contracted in one part, and extremely distended in that immediately adjoining it; the muscular fibre of the contracted portion being in a state of spasm, whilst that of the distended part is paralyzed.

DIAGNOSIS.—From *enteritis*, by the peculiar twisting pain and retraction of the navel; by the absence of fever; by the pain in enteritis being increased, in colic alleviated, by pressure; by the irregular contraction of the abdominal muscles. The same characteristic symptoms distinguish it from inflammation of other abdominal viscera.

From muscular pains of the abdomen by the effect of percussion with the points of the fingers. This produces sudden and severe pain when the muscles are affected, but has no effect in colic. In muscular pain, too, the sudden removal of pressure causes acute suffering.

PROGNOSIS.—*Favourable.* The pain remitting or changing situation; discharging of wind and fæces, followed by an abatement of symptoms.

Unfavourable.—Violent fixed pain; obstinate costiveness; sudden cessation of pain, followed by more frequent hiccup, great watchfulness, delirium, syncope, cold sweats, weak, tremulous pulse; the pulse becoming peculiarly hard (see Enteritis); and the pain, before relieved, being now much increased, upon pressure.

TREATMENT.—Having ascertained that there is no concomitant inflammation, and no mechanical obstruction which can be detected—and, at the same time, that the pain is not merely muscular—two or three grains of calomel, with half a grain or a grain of opium, according to the previous duration of the constipation and the severity of the symptoms, should be given every one or two hours for three or four times in succession; the last dose being followed by an ounce of castor-oil. If the bowels are not relieved by this treatment, a large clyster of thin gruel containing a drachm of the tincture of opium may be thrown up, either by means of the common clyster-pipe or through the flexible tube. Should the bowels still continue unrelieved, and there are still no symptoms of inflammation, the patient should be kept under the influence of opium till a free evacuation takes place. The pain may in the mean time be relieved by fomenting the abdomen with flannels wrung out of hot water or the poppy fomentation.

If signs of inflammation show themselves, or existed from the commencement, that inflammation must be promptly reduced by antiphlogistic measures. (See Enteritis.) It is not unusual in cases of colic to find, on inquiry, that one of the first symptoms was the discharge of a quantity of gelatinous mucus from the bowels. In such cases, there is commonly more or less tenderness in some part of the abdomen, especially in the right iliac fossa, and from six to twelve leeches, followed by a warm bread-and-water poultice, should be applied to the tender spot.

Flatulence may be relieved by the introduction of the long flexible tube, which may also be advantageously employed to throw up warm water into the bowels.

In spite of the persevering employment of these means, six or seven days will sometimes elapse before the bowels can be made to act.

For the removal of mechanical obstructions, the remedies appropriate to those obstructions. (See Intus-susceptio, p. 488.)

COLICA PICTONUM—LEAD COLIC.

Synonyms. Painters' colic. Saturnine colic. Devonshire colic.

Symptoms.—Those of colic from other causes, the pain generally coming on more gradually, and being often accompanied with pains in the limbs, or with weakness, or complete paralysis of the hands or forearms.

Diagnosis.—From colic arising from common causes, by the history of the case and the employment of the patient; and generally by the blue line at the margin of the teeth, indicating the action of lead on the system.

Prognosis.—Generally favourable. Five fatal cases in 500. (Andral.)

Treatment.—Calomel and opium in successive doses, followed by a full dose of castor-oil (Hyd. chloridi gr. iii., Pulv. opii gr. i. every hour for three successive hours, followed after an interval of another hour by an ounce of castor-oil). Enemata of warm water, thrown up by means of the long flexible tube, with hot fomentations or the warm bath; and when the pain is extremely severe, and increased by firm pressure, leeches to the abdomen. (See Colic.)

For the prophylaxis, see Lead Palsy, p. 362.

TYMPANITES—DRUM BELLY.

Symptoms.—The disease sometimes comes on suddenly; at others it is more slow in its progress, and preceded by unusual flatulency, borborigmus, and a frequent expulsion of air upwards and downwards, attended with colic pains; the abdomen is distended, tense, and elastic; the bowels are costive; and dysuria is sometimes present. The abdomen, on percussion, sounds like a drum or bladder filled with air.

The air is, in almost all cases, contained in the stomach and intestines, its most common seat being the arch and sigmoid flexure of the colon. In very rare instances air passes into the sac of the peritoneum, in consequence of ulceration of the bowels. Tympanites is of common occurrence in typhoid fever, and is then styled "meteorismus."

Causes.—Loss of tone in the intestinal canal; errors in diet; excessive use of purgatives; abuse of warm liquids, and of spirituous liquors; a crude vegetable diet; hysteria.

Diagnosis.—From *ascites*, by the absence of fluctuation, and by the sound being clear instead of dull.

Treatment.—*Indications.* I. To evacuate the air. II. To prevent its again accumulating

To fulfil the first indication, recourse must be had to—

1. Antispasmodics and carminatives; æther, oleum anisi, assafœtida, radix armoraciæ, tinctura capsici, cardamoms, ginger, alum, oil of turpentine, tincture of rhubarb.
2. Warm purgative medicines and clysters.
3. Friction with warm stimulating liniments.
4. Encircling the abdomen with a tight bandage.
5. The introduction of a long elastic tube into the rectum.

In milder cases of flatulence the remedies usually resorted to are essence of ginger, or some strong spirit, mixed with hot water, and swallowed as hot as it can be readily borne.

The second indication requires,

1. Tonics; such as are recommended in dyspepsia.
2. Regular exercise.
3. Carefully avoiding all food of a flatulent nature.
4. The occasional use of stomachic aperients.

HÆMORRHOIS—THE PILES.

Species.—1. External. 2. Internal.

1. EXTERNAL PILES.

Character.—Small round tumours, situated at the verge of the anus, and covered with skin or mucous membrane, or painful folds of skin. The tumours either discharge blood, when they are called *bleeding piles*, or they do not bleed, when they are called *blind piles*. When free from pain they are called indolent.

Symptoms.—When piles are in a state of inflammation they occasion heat, itching, and pain, with a sense of weight and tension, increased upon going to stool, which generally occasions a discharge of blood.

2. INTERNAL PILES.

Symptoms.—A sensation as of a foreign body in the rectum, with frequent desire to relieve the bowels, and painful strainings, accompanied by discharges of blood. Dysuria, pain in the back and down the thighs, and, in females, uterine irritation, are superadded in the more severe cases.

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* Dr. O'Beirne passes an œsophagus tube into the sigmoid flexure, and allows the escape of gas. He relates cases of this disease in typhus, malignant uterine phlebitis, peritonitis, and strangulated hernia, in which a cure was effected. On Defecation.—Graves and others confirm this statement.

CAUSES.—Luxurious and sedentary habits; habitual costiveness; plethoric state of the vessels; hard riding; excesses of various kinds; the suppression of some long-accustomed evacuation; the habitual use of strong aloetic purgatives; pressure of the abdominal viscera on the hæmorrhoidal veins; pregnancy.

PROGNOSIS.—The only unpleasant consequence in general to be apprehended from the piles, is the presence of inflammation, and consequent suppuration. When a venous-plethora exists, which is often the case in old age, bleeding piles are salutary, and their suppression is often followed by apoplexy, or hæmorrhage from other parts. Piles often relieve affections of the head, chest, abdomen, and uterus, and, when suppressed, cause disease in those parts.

TREATMENT.—The treatment of piles is—I. General. II. Local.

I. Of the general treatment the indications are—*a.* To promote the circulation of blood through the abdominal vessels. *b.* To keep the bowels free.

a. The first indication is fulfilled by the avoidance of sedentary habits, by active exercise, and by abstemious living.

b. The bowels to be kept free by gentle aperients, such as the senna or sulphur electuary, rhubarb and magnesia, the compound rhubarb pill, or small doses of blue pill, followed by castor-oil or a saline aperient.

II. The *local* treatment of piles consists in the strict observance of cleanliness, washing with cold water after each motion, and the careful return of the piles, if, being internal, they protrude during the evacuation of the bowels; in the use of astringent washes or ointments (such as the zinc lotion, the liq. plumbi diacetat., the unguentum gallæ, or an ointment consisting of pulv. Hellebori nigri ʒi to ℥i of lard).

Bleeding piles also require the use of cold astringent applications and injections. Daily injections of cold water are highly beneficial. When the hæmorrhage is profuse, astringents may be given internally. The best are the acetate of lead with an excess of acetic acid and opium. The best way to stop the hæmorrhage, when extremely profuse, is by pressure. This may be most conveniently applied by dossils of lint or by the finger.

If the pile is an enlarged vein, and this becomes strangulated by the spasm of the sphincter ani, it should be compressed and flattened with the finger and passed into the rectum. This operation may have to be frequently repeated. A T bandage may become necessary. The hip-bath facilitates the reduction of strangulated piles.

When the tumours about the anus are painful, and accompanied by inflammation, leeches should be applied, and cooling lotions of solution of lead, or cold poultices.

The inflammation often runs high, and produces a considerable degree of fever. The antiphlogistic diet is then necessary, and the means recommended against inflammatory fever.

When, instead of being inflamed, the tumours are relaxed and flaccid, and at the same time irritable, astringent applications should be used, as ointment of galls, decoction of oak-bark, balsam of copaiba, and cold; and Ward's paste or the confectio-piperis C. of the London Pharmacopœia may be given in the dose of a tea-spoonful three times a-day.

If the tumours close the anus, we must introduce a common candle, an oiled bougie, tents, or a piece of sponge well oiled. Patients affected with piles should sleep on a hair mattress, sit as little as possible, and if sedentary or literary, pursue their avocations in an erect posture. The bowels should be opened daily either by coarse bread, the electuary of sulphur, or castor-oil.

When these means fail, the tumours may be removed by excision.

Half a pint of cold water injected into the rectum twice or thrice a-day, and retained as long as possible, is a most effectual remedy. (G.)

TABES MESENTERICA—ABDOMINAL CONSUMPTION.

This name is given to a tubercular or scrofulous degeneration of the mesenteric glands, which sometimes occurs without any disorder of the functions of the alimentary canal, but, in by far the majority of cases, follows upon long-continued irritation or ulceration of the mucous membrane of the intestines.

Symptoms.—These are extremely obscure, when the disease is idiopathic; but when it is the result of disease in the intestinal canal, it is characterized by the symptoms of infantile remittent fever (p. 296). The only certain sign of this complication is the enlargement of the glands felt through the parietes of the abdomen.

Causes.—*Predisposing*. The scrofulous or tubercular diathesis; the age of infancy and childhood; improper food; bad air.

Exciting.—Irritation of the mucous membrane of the intestines from scybala, from worms, or from improper food.

Treatment.—This will depend upon the existing complications, and on the condition of the bowels which have preceded and produced it. Purgatives regularly and perseveringly administered in constipation; a strict regulation of the diet, with small doses of hyd. c. cretâ and opium (hyd. c. cretâ gr. ½ to gr. i. pulv. cretæ C. c. opio gr. ii. to gr. v. according to the age), in diarrhœa; food adapted to the age and strength of the child; and, where great debility is present, tonics;—the treatment, in fact, of infantile remittent fever. (See p. 297.)

Nourishing and stimulating food, under the supposition that the strength of the patient requires support, is contraindicated. A bland farinaceous diet is that best adapted to the recovery of the patient. The affection of the glands requires gentle friction with oil or stimulating liniments two or three times in the day. In extreme cases, iodine ointment may be used for this purpose. The treatment of infantile remittent fever, aided by frictions to the abdomen, will often remove considerable enlargement of the mesenteric glands, and restore the patient to perfect health. As these glandular enlargements occur in children of a tubercular diathesis, the chest should be carefully attended to, and if the patient recover, directions should be given for a close attention to the future health of the patient.

INTUS-SUSCEPTIO.

Symptoms.—Those of colic. The history of the case is most commonly as follows:—After a violent straining at stool, a sudden attack of severe colic, followed by constant desire to go to stool, violent tormina and tenesmus, discharge of a small quantity of bloody mucus, and the symptoms of enteritis. These symptoms are not decisive; but the existence of the disease becomes more probable after the failure of attempts to evacuate the bowels, and the supervention ot hiccup and stercoraceous vomiting.

Anatomical Character.—One portion (from a few lines to more than a foot in length) of the intestines enclosed within another. In most cases there is only one of these invaginations, but in some instances there are several. The most common seat of the obstruction is the junction of the small with the large intestines; but it may take place in any part of the small intestines, and in the arch of the colon. A natural cure is sometimes effected by adhesion, suppuration, gangrene, and separation of the enclosed portion of intestine.

Diagnosis.—Symptoms of obstruction of the bowels occurring suddenly, and followed by a perceptible tumour in the abdomen would give reason for suspecting the existence of this disease. In certain instances the discovery of a portion of the intestinal tube in the evacuations from the bowels, has furnished conclusive evidence of the true cause of the obstruction.

Prognosis.—Very unfavourable. In a few cases relief is given by remedies, and in a few cases also recovery takes place after sloughing of the constricted portion of intestine.

Treatment.—*Indications.* 1. To subdue any existing inflammation. 2. To palliate the sickness. 3. To remove the obstruction.

I. If there is decided tenderness in any part of the abdomen, leeches must be applied to the tender spot, followed by warm poultices, or warm fomentations. If inflammation runs very high, and there is much inflammatory fever, venæsection may become necessary.

II. The distressing vomiting which accompanies obstruction of the bowels is best relieved by small quantities of liquid in a state of effervescence. Creosote (one drop added to each dose of medicine, or draught of liquid) has also been recommended for this purpose. Opium in the solid form, or in the form of tincture, should also be given at short intervals, with a view of moderating the peristaltic action.

III. When the cause of the obstruction is still doubtful, trial may be made of the treatment proper to colic. Three grains of calomel with a grain of opium, may be given every hour, and after an interval of another hour from the last dose of calomel and opium, an ounce of castor-oil. If the bowels still remain costive, a large quantity of warm water should be thrown up into the bowels by the long elastic tube; and if the progress of the tube is obstructed at any point of the large intestines, an effort should be made to overcome the resistance by moderately firm pressure, aided by the liberal injection of warm water. Should this fail, a further attempt at removing the obstruction should be made by injecting air. This treatment may be repeated at intervals, till the bowels are relieved, or till the attempt to obtain relief in this way seems hopeless. After the failure of all these attempts, the mechanical remedies recommended for removing the obstruction, may be resorted to; or, an operation may be performed, the sac of the peritoneum being opened, and the intestine unravelled.

REMEDIES.—Crude mercury (from one to three pounds) swallowed. Small shot administered in the same way. Tobacco injections.

OTHER CAUSES OF OBSTRUCTION OF THE BOWELS.—Intus-susceptio is only one of several forms of mechanical obstruction leading to the symptoms usually designated as *ileus* or *volvulus*, symptoms which also occur in the more severe cases of colic, in the absence of permanent causes of obstruction. There are also other causes of obstruction within the bowels themselves, which often prove very difficult of removal, such as impacted and hardened fæces, and solid concretions formed by indigestible and insoluble matters swallowed in large quantities. The chief permanent causes of obstruction are twisting of the bowels, adhesions of the peritoneum, organized bands of lymph, tumours formed external to the intestines, and cancerous degenerations of the intestines themselves. The treatment, supposing that we are ignorant of the exact nature of the obstruction, will be that prescribed above.

DISEASES OF THE STOMACH AND INTESTINES.

GASTRO-ENTERITS MUCOSA . .	English Cholera.
CHOLERA MALIGNA	Malignant Cholera.

GASTRO-ENTERITIS MUCOSA—ENGLISH CHOLERA.

SYMPTOMS.—Nausea, pain, and distension of the stomach and intestines; quickly succeeded by violent and frequent vomiting, and by purging of bilious or feculent matter, and, when this has been discharged, of mucus. The tongue is furred; the pulse is frequent, small, and sometimes unequal; and there is much thirst. In rare cases death takes place within the space of twenty-four hours, after hiccup, cold sweats, great anxiety, painful cramps of the extremities, and, in rare cases, universal convulsions. In very severe cases there is marked blueness of the surface.

CAUSES.—Excessive heat, or sudden transitions from heat to cold; the summer and autumnal seasons; food of difficult digestion; putrid meat; rancid food; the colder fruits, such as cucumber, melon, &c.; active and violent purgatives; irritant poisons; catarrh.

DIAGNOSIS.—From diarrhœa by the coexistence of vomiting. The disease in its most severe form does not admit of being distinguished with certainty from Asiatic cholera.

PROGNOSIS.—*Favourable.* A gradual diminution of the symptoms, especially of the vomiting; succeeded by sleep, or a gentle moisture on the skin. The disease, when protracted to the third or fourth day, seldom proves fatal.

Unfavourable.—Painful cramps of the extremities; convulsions; great prostration of strength; cold, clammy sweats; anxiety; great distension of the abdomen; short hurried respiration; continual hiccup; intermitting pulse.

TREATMENT.—An immediate restriction of the diet to farinaceous substances, to the entire exclusion of solid food, is sufficient even in cases of some severity to effect a cure. A mucilaginous mixture, with twenty drops of tincture of hyoscyamus, or a scruple of the compound chalk and opium powder, may be given at the same time, three or four times a-day. When there is great prostration of strength, full doses of opium, with stimulants, are indicated, with warmth to the surface and feet, and mustard sinapisms to the extremities.

When the disease has subsided, the usual diet must not be immediately resumed, but the patient should be confined for a few days to a less strict farinaceous diet. Tonics and generous diet may then be necessary for the restoration of the patient's strength.

Calomel has been recommended, but is unnecessary, and may be injurious. Rest to the stomach and bowels is the rational treatment, and this is secured by the diet prescribed.

CHOLERA MALIGNA—MALIGNANT CHOLERA.

Synonyms.—Cholera morbus; epidemic, spasmodic, Indian, Asiatic, blue, pestilential, cholera.

Symptoms.—The disease sets in in two ways: suddenly, or after a preliminary attack of diarrhœa of some hours' or days' continuance. In either case, the symptoms may be those of extreme collapse, proving rapidly fatal (cholera asphyxia). But in the majority of cases the following is the order of the symptoms: after a preliminary attack of ordinary diarrhœa, of greater or less severity, and continuing for some hours or days, the patient is seized with symptoms of collapse, accompanied, in most cases, by vomiting. The matters rejected from the stomach and bowels are free from bile, without odour, bear a close resemblance to rice-water, and are familiarly known as "rice-water evacuations." Severe and painful cramps commence in the fingers and toes, and rapidly extend to the calves of the legs, to the thighs, and muscles of the abdomen; the eyes are sunk, and surrounded by a dark circle; the features contracted and sharpened; the expression of countenance indifferent and apathetic; the face, extremities, and sometimes the whole surface of the body, assume a leaden, bluish, or purple hue; the extremities are shrunk and contracted; the nails blue; the hands clammy and sodden; the surface covered with a cold sweat; the pulse thready or imperceptible at the wrist, arm, axilla, temple, or neck; if blood is drawn it is found thick and dark. There is great restlessness and incessant jactitation, and the patient is tormented with thirst; the inspiration is difficult, and the expiration short and convulsive; the voice is plaintive and suppressed, the patient speaking in a hoarse whisper; the tongue is white, or of a leaden colour, cold and flabby; the temperature often as low as 79° or 77°, and the breath is cold. The secretion of urine is entirely suppressed, and there is an earthy or cadaverous odour exhaled by the body. The patient generally retains his faculties to the last.

Terminations.—In r[illegible]very; in prolonged gastric irritation; or in secondary fever, of the [illegible]phoid character.

Morbid Anatomy.—The alimentary canal filled with a white flaky liquid; the mucous membrane as if sodden with the same; all the glands of the intestines large and prominent; the veins loaded with dark blood; the urinary bladder contracted.

DURATION.—In fatal cases, from less than one hour to twelve hours or more. More than half the fatal cases within the first twenty-four hours; nearly a sixth of the cases within six hours.

MORTALITY.—At the onset of the epidemic nine-tenths of the cases; on the average about one-half of the cases; at the decline a small fraction.

CAUSES.—*Predisposing.* Debility; impaired health; intemperance; impure air; impure water; low and damp situations; the summer and autumn seasons.

Exciting.—A peculiar poison diffused through the atmosphere. There is also reason to believe that the disease spreads by contagion, though the contagion is not so intense as to cause any great anxiety among the attendants on the sick.

DIAGNOSIS.—From *English cholera*, by the absence of bile from the matters rejected from the stomach and bowels, which resemble rice-water; by the early occurrence and intense degree of collapse, and by the great mortality. The complete suppression of urine, the intense blueness of the surface, the hoarse, feeble voice, and the shrunken appearance of the countenance, are other diagnostic signs of this disease. But these diagnostic marks will not serve to distinguish the disease from the most severe cases of English cholera.

PROGNOSIS.—*Favourable.* Cessation of cramp; subsidence of vomiting and purging, and the reappearance of bile in the motions; voiding of urine; return of the pulse; restoration of heat in the extremities and surface of the body; disappearance of the blueness of the skin and of the facies Hippocratica.

Unfavourable.—Extreme collapse. If the patient survive the stage of collapse, the symptoms of the typhoid state. Advanced age, previous debility, or ill health, and previous habits of intemperance, are unfavourable circumstances, and the disease is somewhat more fatal in females than in males.

TREATMENT.—I. Of the preliminary diarrhœa. II. Of the stage of collapse. III. Of the stage of reaction.

I. The preliminary diarrhœa requires the treatment of common diarrhœa. In the common run of cases, a scruple of the compound chalk and opium powder may be given three or four times a-day, the diet being at the same time restricted to gruel or arrow-root made with milk. In more severe cases, grain doses of opium may be given every hour, or every two or three hours. Where the patient is in a weak and exhausted state, brandy may be administered from time to time. In epidemics of Asiatic cholera, patients suffering from diarrhœa should be promptly treated and carefully watched.

II. The stage of collapse is best treated by large draughts of salt and water (in the proportion of three table-spoonfuls of common salt to a quart of water), repeated every quarter of an hour till reaction is established. A scruple of chlorate of potash might perhaps be advantageously added to each quart of the solution. At the same time reaction should be promoted by warm blankets, bottles of hot water to the feet and epigastrium, and assiduous friction. The hot-air bath is an effectual mode of restoring warmth to the surface.

III. Reaction having been established, the treatment must be guided by the symptoms actually present. The thirst may be assuaged by large draughts of cold water; diarrhœa, if it exist, may be met by opium in doses of one grain, repeated at short intervals, or by a strong decoction of logwood in combination with laudanum and aromatic spirits of ammonia; cramps may be relieved by forcible extension of the parts affected; and the warmth of the skin may be kept up by frictions and warm applications.

If the reaction is excessive and assumes the form of fever, it must be treated on the same principles as common continued fever; and if it assume the typhoid type, by the remedies appropriate to that condition.

PROPHYLAXIS.—Temperate habits; the observance of the rules of health; the moderate use of wholesome vegetables and ripe fruits; and the early treatment of diarrhœa. On the approach of cholera, the authorities should cause visits to be made from house to house in search of cases of diarrhœa, and should make arrangements for the prompt treatment of such cases. They should also adopt measures for insuring personal and household cleanliness; for the early removal of all refuse matters; for the suppression of nuisances; and for a sufficient supply of wholesome food and pure water.

REMEDIES. — Venæsection; emetics; warm and hot-air baths; exhausted air-bath; frictions with every form of stimulating liniment; internal stimulants; as in the last stage of fever. Saline medicines; injections of warm water and saline solutions into the veins; inhalation of oxygen gas; calomel, in scruple or half-drachm doses every hour; cajeput-oil; galvanism; nitric acid applied to the nucha; actual cautery along the spine; large doses of opiates; strychnine; acetate of lead in combination with opium; copious libations of cold water. A drachm of laudanum and a scruple of calomel administered at the first seizure, and repeated at a short interval, if necessary; chloroform; chloroform and brandy; quinine in large doses; Indian hemp; terchloride of carbon; emetics of tartarized antimony or of tartarized antimony and ipecacuanha; liq. pot. arsenitis; nitrous acid; the wet-sheet; extreme cold; prussic acid and carbonate of soda; phosphorus; lemon-juice. (For a very complete list of the remedies which have been employed or recommended, see Bushnan on Cholera, p. 130.)

DISEASES OF THE LIVER, SPLEEN, AND PANCREAS.

DISEASES OF THE LIVER.

Icterus	Jaundice.
Hepatitis	Inflammation of the Liver.
Abscess of the Liver.	
Biliary Concretions.	

ICTERUS—JAUNDICE.

Synonyms.—Morbus arquatus; aurigo; morbus regius.

Symptoms.—Languor; inactivity; loss of appetite; bitter taste in the mouth; sense of uneasiness or pain in the right hypochondrium; the tunica conjunctiva of the eye and the whole surface of the body of a yellow colour; the urine is high-coloured, and tinges linen yellow; nausea, and, in some cases, vomiting; obstinate costiveness or diarrhœa, the stools are of a clay colour, but in some cases, like the urine, high-coloured; in rare instances, the sweat and saliva are yellow, and all objects seen by the patient are tinged of the same colour; the pulse is generally slow, yet sometimes, especially when the pain is acute, it becomes quick and hard, and there is a feverish heat and dryness of the skin. In some cases, also, the skin is the seat of a troublesome sensation of heat and pricking. Should the disease be long protracted, petechiæ and maculæ sometimes appear in different parts of the body; the skin before yellow, turns brown or livid; even passive hæmorrhages and ulcerations have broken out, and the disease has in some instances assumed the form of scurvy.

Causes.—Biliary calculi in the gall bladder, or its duct; inspissated bile; spasmodic contraction of the ducts themselves; violent passions of the mind; pressure upon the ductus communis choledochus, either by collections of hardened fæces, or by tumours of neighbouring viscera, as of the pancreas, of the mesenteric glands, of the pylorus, of the duodenum, &c.; diseases of the liver itself, as inflammation, partial scirrhus, &c.; the active operation of some poisons and purgatives; morbid redundance of bile; hot climates; pregnancy.

Diagnosis.—The characteristic symptoms which distinguish this from every other disease are, the yellow colour of the skin, and of the tunica conjunctiva of the eye; the deep-yellow colour of the urine; and, in most cases, the white or clay-coloured fæces.

Prognosis—*Favourable.* The disease having arisen from a cause that admits of easy removal; such as spasm, accumulated fæces, or temporary pressure during pregnancy; the strength and appetite little impaired; the disease appearing suddenly; cessation of local pain, followed by bilious diarrhœa. The disease, even in mild cases, runs a chronic course, the skin rarely recovering its proper colour under two or three weeks.

Unfavourable.—Circumstances leading to the suspicion of the jaundice having originated in structural disease, either of the liver itself, or of the neighbouring viscera; the previous irregular life of the patient; long-continued local pain and tumour; symptoms of hectic; colliquative diarrhœa; symptoms showing a determination to the head, as vertigo, flushed countenance, headache; supervening anasarca; its being complicated with phthisis or any other severe disease; a very dark colour of the skin.

Treatment.—When jaundice arises from inflammation of the liver, or from obstruction to the escape of bile from the duct, it requires the treatment of hepatitis or of biliary concretions. (See those diseases.) When, however, there is no pain in the right hypochondrium, no fever, and the paroxysms of acute pain due to the passage of gall-stones are absent, the treatment will consist in the use of emetics, and of gentle aperients to keep the bowels free. In the more strongly-marked cases of jaundice, we may begin the treatment by administering an emetic (Pulv. ipecac. ℈i., Ant. pot. tart. gr. i); and when that has ceased to operate, a scruple of calomel, followed within two or three hours by an ounce of castor-oil. In cases of less severity, the treatment having been commenced by an emetic, the bowels may be kept free by some saline aperient given two or three times a-day. (℞. Magnes. sulph. ʒi, Magnes. carb. gr. x. Ant. pot. tart. gr. ⅛. Aquæ menthæ pip. Aquæ, āā ℥ss.) This medicine may be given during the whole of the illness, as often as may suffice to keep the bowels open two or three times a-day.

Remedies.—Small doses of mercurial preparations, as a grain of hyd. c. cretâ or blue pill, or half a grain of calomel in combination with small doses of opium, three or four times a-day; nitro-muriatic acid; nitro-muriatic acid bath; Bath and Cheltenham waters.

HEPATITIS—INFLAMMATION OF THE LIVER.

Species.—1. Hepatitis acuta. 2. Hepatitis chronica.

1. ACUTE HEPATITIS.

Symptoms.—Pain in the right hypochondrium, increased by pressure, by a deep inspiration, by coughing, or by lying on the left side; dry cough; difficulty of breathing; shooting pains in the chest, resembling pleurisy; sympathetic pain in the right shoulder; a yellow tinge of the tunica conjunctiva, and sometimes actual jaundice; high-coloured urine; vomiting; hiccup; costiveness or diarrhœa. There is also more or less pyrexia. In some instances, there is a deficiency of bile in the intestines, in which case the fæces are of a clay colour; in other instances, a superabundance, which is then rejected by vomiting and stool.

When the *concave* surface of the liver is affected, the pain is more obscure, and is referred to the back; the breathing is less anxious, the functions of the stomach more disturbed, producing vomiting, hiccup, and other systems of gastritis.

When the left lobe of the liver adjacent to the stomach is inflamed, there is nausea or vomiting; and when the posterior and inferior portion of the organ near the kidney is implicated, there is more or less pain or disturbance in the function of the last-mentioned organ.

TERMINATIONS.—In resolution; in chronic disease; in diffused or circumscribed abscess; in gangrene.

CAUSES.—All the common causes of inflammation; biliary concretions; the violent operation of emetics; external injury; intense heat; hot climates; intemperance in the use of spirituous liquors.

DIAGNOSIS.—From *pneumonia,* by pain in the shoulder; by the pain in hepatitis being increased by pressure, in pneumonia unaffected by it; by the difficulty, in pneumonia, of lying upon the affected side, while, in hepatitis, pain is occasioned by lying upon the opposite side; by the yellowness of the skin and conjunctiva; by the colour of the urine and fæces; by the cough being generally unaccompanied by expectoration; by the absense of the stethoscopic signs of pneumonia.

From *gastritis* and *dyspepsia,* by the seat of the disease, discovered by tenderness upon pressure; and by the symptoms just detailed.

PROGNOSIS. — *Favourable.*—About the third, fifth, or seventh day, bilious diarrhœa; universal and free perspiration; copious sediment in the urine; inflammation appearing upon an external part; hæmorrhage from the hæmorrhoidal veins; an abatement of fever.

Unfavourable.—Intensity of pain and fever; the pain confined to a point; continual hiccup; cold extremities; obstinate constipation. Rigors and hectic fever, as indicating the formation of abscess.

TREATMENT.—*Indications.* Those of other acute inflammations.

They are best fulfilled by,—

1. General bloodletting.

Most authors and practitioners have observed, that bloodletting ought not to be carried to the same extent in hepatitis as in other phlegmasiæ. Some assign as a reason for this, the peculiarity of the circulation through the liver; others, that the organ affected is less essential to life; or that the inflammatory symptoms do not often run so high as in the other inflammations.

General bloodletting is seldom serviceable after the fourth day; but the state of the pulse and urgency of the pain must always direct us with regard to it.

2. Local depletion by cupping or leeches.

When the hæmorrhoidal or catamenial evacuations are suppressed, the abstraction of blood from the anus is preferable. The leeching should be repeated so long as the pain is severe.

3. When the more acute symptoms have been subdued, blisters applied over that part of the region of the liver which is the seat of the pain.

4. Brisk saline aperients.

5. Saline and antimonial diaphoretics.

6. Mercurial inunction, which is to be preferred to the internal administration of the preparations of mercury, with a view of affecting the mouth, especially during the inflammatory stage of the disease.

7. A low diet, consisting chiefly of farinaceous food.

2. CHRONIC HEPATITIS.

SYMPTOMS.—The attack of *chronic hepatitis* is in general so gradual, and the symptoms at its commencement so obscure, that it is long unattended to. It is marked by symptoms of dyspepsia, loss of appetite, flatulence, sense of fulness, and distension of the stomach. At length the health is impaired, there is a sense of weight and obtuse pain in the region of the liver, increased by deep pressure or by lying on the left side, with an enlargement and preternatural hardness of the organ, obvious to the touch; or there is pain referred to the right shoulder; the countenance becomes sallow; the patient is torpid, inactive, and desponding; the functions of the primæ viæ are greatly disturbed; the bowels are obstinately costive; the stools clay-coloured; and there are repeated attacks of jaundice, followed, at length, by dropsy.

In chronic hepatitis, and other diseases of the liver, accompanied by great enlargement of the organ, it presses on the vena porta, obstructs the return of the venous blood from the abdomen, causes congestion of the peritoneum and cellular membrane of the inferior extremities, and induces ascites or effusion into the peritoneal cavity, and anasarca or œdema of the lower limbs. In such cases a cure cannot be effected without the removal of the disease of the liver, which is the cause of the dropsy. Many diseases of the liver, like those of all other organs, are incurable.

CAUSES.—The acute form; chronic dyspepsia; phthisis pulmonalis; hot climates; excess in eating or drinking; intemperance; hypertrophy of the heart; structural diseases of the liver, such as carcinoma, tubercles, melanosis, hydatids, fatty degeneration, effusions of blood (hepatic apoplexy).

DIAGNOSIS.—From *empyema* and *pneumothorax* by the non-protrusion of the intercostal spaces in chronic enlargement of the liver, and, in many instances, by tracing the tumour from the margin of the ribs. Sometimes the nature of the permanent disease which has caused the chronic inflammation of the liver may be ascertained by external examination. The nodulated enlargement, known as the "hobnail liver," or *cirrhose*, may sometimes be perceived through the parietes; so also with the swollen projection of cancer, the single large round projection caused by a collection of hydatids, and the single smooth round tumour near the margin of the liver, caused by a distended gall-bladder.

Prognosis.—When the disease is attended by well-marked enlargement of the liver, probable remote termination in ascites and anasarca. In the absence of distinct enlargement of the organ, the prognosis may be favourable; but the disease does not admit of very prompt cure.

Treatment.—*Indications.* I. To subdue existing inflammation. II. To relieve the circulation through the vena porta. III. To improve the general health

I. The first indication may be fulfilled by the occasional application of leeches to the region of the liver as often as it is tender to the touch; by blisters, and by mercurial preparations in small doses, frequently repeated, with mercurial inunction, so as slightly to affect the gums.

II. The second indication is fulfilled by the administration of saline aperients, given every morning, so as to keep the bowels loose. When the intestinal canal is healthy, drastic purgatives are often more effective than any other remedies. When the digestive powers are much impaired, these measures may be combined with a course of bitter tonics, such as the infusions of gentian, quassia, or calumba, with soda.

III. This indication is best fulfilled by removal from a warm to a cold climate, a sea voyage, and moderate exercise in the open air.

Remedies.—Mercurial preparations administered with a view of stimulating the liver. Extract of taraxacum given with the same view. The hydriodate of potass, or iodine given internally, and used externally.

The nitric or nitro-muriatic acid, has been frequently of great use when mercury cannot be employed, or when there is a redundancy of bile. It may be given internally, in doses of ten or twenty drops, with any of the tonic infusions, or it may be used, greatly diluted with water, as a bath.

Chalybeates, of which the tinctura ferri muriatis, in doses of twenty drops or half a drachm, is the best.

ABSCESS OF THE LIVER.

Symptoms.—If in a case of hepatitis severe rigors occur, followed by well-marked hectic fever, and the previous continued pain, whether dull or acute, is exchanged for a distinct throbbing, there is reason to believe that suppuration has taken place. Rigidity of the parietes of the abdomen, especially on the right side, and in the right rectus muscle, is also of common occurrence in abscess of the liver.

Abscess of the liver may burst into the stomach, and be emptied by vomiting; into the colon or duodenum, and be evacuated by the bowels; through the diaphragm into the cavity of the chest, constituting empyema; into the lung or bronchial tube, and be expectorated; or, it may open externally, between the ribs, or below them, through the muscles of the back. In very rare cases, the abscess discharges itself into the pericardium, into the pelvis of the kidney, or into the ascending vena cava. Sometimes the abscess discharges itself into the cavity of the abdomen, where it sets up fatal peritonitis.

CAUSES.—*Predisposing.* Those of the inflammation of the liver which precedes it. *Exciting.*—Phlebitis (leading to purulent deposits in the liver and lungs). Dysentery (Dr. Budd). Operations on the rectum, bladder, or vagina. Ulceration of the stomach and intestines.

COMPLICATIONS.—Ascites. Inflammation, more or less extensive, of the organs upon which the abscess presses, and through which it ultimately discharges itself.

DIAGNOSIS.—The nature of the disease will be inferred from the colour of the discharged matter, and from the rigors, throbbing pain, and hectic fever attending the process of suppuration.

PROGNOSIS.—This will depend, in great measure, on the direction in which the abscess discharges itself, and on the degree of inflammation and fever which accompany its progress. The prognosis is most favourable when the abscess discharges itself through the parietes of the chest or the abdomen. The prognosis is less favourable before than after the discharge of the abscess, as the process of suppuration gives rise to severe constitutional irritation. The prognosis is also highly unfavourable when the abscess discharges itself into the peritoneal cavity.

TREATMENT.—Should the abscess point externally, it must be brought forward as quickly as possible by poultices and fomentations, aided by a generous diet, and the use of quinine, cinchona, and bitters: an early incision is to be made when it points.

BILIARY CONCRETIONS.

SYMPTOMS.—Biliary calculi give rise to no pain or inconvenience, unless they occasion some impediment in the gall-ducts. The passing of the gall-stone is accompanied by the following symptoms:—Excruciating pain in the epigastrium, extending to the right hypochondrium and back, occurring in severe paroxysms, with intervals of comparative case, during which there is a dull heavy pain in the epigastric region. The pain, which varies with the size of the calculus, and the force of the spasm which it occasions, is generally relieved by firm pressure. Nausea, frequent vomiting of sour fluid, and constant hiccup, are also often present, and jaundice generally supervenes in the course of the attack. The urine is generally high-coloured, and the motions pale. The general symptoms are an infrequent full pulse, or a frequent and feeble pulse, with profuse perspiration; or, if there is inflammation present, the general symptoms of fever. The passage of the calculus from the gall-ducts into the intestine is attended by a sudden cessation of the pain.

TERMINATIONS.—In inflammation, followed by suppuration, peritoneal adhesion and discharge of the calculus externally, or through one of the internal organs, as in ordinary abscess of the liver. After the escape of the gall-stones into the intestines, constipation or obstinate obstruction of the bowels, either immediate, when the stones are large, or remote, when they have become the centres of further intestinal concretions. Sometimes large quantities of gall-stones are found in the gall-bladder and gall-ducts after death, when no sign of their presence has existed during life.

DIAGNOSIS.—The pathognomonic sign is the excruciating pain relieved by pressure. When large numbers of gall-stones are collected in the gall-bladder, their presence may sometimes be detected by a rough crepitation under the finger. By watching the evacuations, and diluting them with water, the gall-stones may be sometimes collected floating on the surface. If the gall-stone is round and smooth, there is a presumption in favour of its being the only one; but if it presents a flattened surface, it is to be presumed that there are several gall-stones, and that they will be passed sooner or later. The calculi vary in size from that of a small seed to that of a walnut, or even larger. They have been found in the intestines of very great size, and moulded so as to fill the canal, and to give rise to serious obstruction. They are commonly of a dark yellow-brown colour, of soft consistence, and have several flattened surfaces, due to their contact with each other. They consist of cholesterine and the colouring matter of the bile, sometimes blended with carbonate or phosphate of lime.

TREATMENT.—*Indications.* I. To relieve the severity of the spasm. II. To reduce existing inflammation.

I. The first indication is fulfilled by opium, the warm bath, warm fomentations, emetics, and bloodletting. The *opium* may be given in doses of a grain, or twenty drops of laudanum, every hour, and in a clyster every six hours (forty minims to one drachm in four ounces of starch or gruel). The *warm bath* should be of the temperature of 100° to 110°, and should be continued till faintness comes on. *Warm fomentations* are generally employed; but it has been recommended to apply pounded *ice* to the epigastrium. *Emetics* have been extolled by some authors, and blamed by others. They are admissible in the absence of inflammation, but are scarcely safe when inflammatory symptoms exist.

II. The second indication is answered by *bleeding*, which is useful chiefly as an antiphlogistic measure; but as it produces debility, it also tends to relax existing spasm. It should always be employed in plethoric persons, or in those prone to suffer from inflammatory diseases. It may be followed up, in the absence of vomiting, by nauseating doses of tartar-emetic.

OTHER ORGANIC DISEASES OF THE LIVER.

The liver is subject to several organic diseases besides those already described—to hypertrophy, atrophy, induration, and softening; to fatty degeneration, cirrhosis, tubercular deposits, serous cysts and hydatids, and to all the forms of malignant degeneration.

Fatty degeneration of the liver is of very common occurrence in phthisis pulmonalis, and in fatty degeneration of the kidney and other internal organs, and it is very common in drunkards. It is generally, but not always, accompanied by a great increase in size, and when once developed, does not admit of cure. The treatment will be palliative, and regulated by the existing state of the system, and the character of the hepatic derangement.

Cirrhosis, or hobnail liver, is also a common disease, but less frequently present in persons given to habits of intemperance. When present in its most characteristic form, it is marked by the peculiar roughness or granular state of the surface, the diminution of the bulk of the organ, and the coexistence of ascites. But the surface of the liver may present highly characteristic appearances of the disease, without any diminution in the size of the organ, and even with a marked increase of bulk and weight.

Serous cysts and hydatids of the liver are also of common occurrence. They sometimes remain torpid for long periods; but in other instances, they excite inflammation in the surrounding structure of the organ, and give rise to abscess of the liver.

Malignant degenerations are very apt to occur in the liver. They assume the several forms of schirrus, medullary sarcoma, and melanosis; and like malignant degenerations of other important viscera are necessarily fatal. They generally occasion a great increase in the size of the organ, and are accompanied by obstinate jaundice and chronic ascites. The treatment of all these organic diseases of the liver is palliative, and varies with the variation of the symptoms, and the existing state of the system.

DISEASES OF THE SPLEEN.

The spleen is said to be the seat of inflammation, acute and chronic, as well as of simple enlargement, the result of congestion. But as the symptoms of splenitis are admitted to be very obscure, it will suffice to treat the diseases of the spleen under the single head of enlargement of that organ.

ENLARGEMENT OF THE SPLEEN.

Symptoms.—The symptoms accompanying this affection are obscure, being, for the most part, due to interference with the functions of the parts submitted to pressure. Dull pain in the left side; dyspnœa; dry cough; inability to lie on the right side; depression of spirits; dyspeptic symptoms; and in extreme cases, dropsical effusions, extreme pallor of countenance, and an unusual tendency to hæmorrhage, dysentery, and scurvy, may be mentioned among the more usual accompaniments of this disease.

The state known as *leucocythemia*, and characterized by a great excess of white corpuscles in the blood, is often found coexisting with diseased conditions of the spleen.

Causes.—Previous attacks of ague; morbid degeneration, especially the deposit of tubercles; morbid softening.

Diagnosis.—Enlargement of the spleen is distinguished by the situation of the tumour in the left hypochondrium, extending, in extreme cases, to the epigastrium, the umbilicus, and the hypogastrium; by the tumour being solid, and smooth, generally of an oblong shape, lying beneath the integuments, and moveable. The organ, which is the seat of the enlargement, may also be inferred from the history of the case. The previous occurrence of ague will always afford a probability in favour of the tumour being situated in the spleen.

Treatment.—The use of the iodine ointment, or tincture of iodine externally, and the hydriodate of potash, with tonics, internally; leeches to the seat of the disease, if there is much abdominal tenderness; friction, in the absence of pain; gentle aperients and alteratives, and moderation in diet. If the disease has been preceded by ague, bark or quinine is the proper tonic, and should be preferred to all other remedies.

Remedies.—Bromide of potassium. Mercury is contraindicated.

DISEASES OF THE PANCREAS.

Symptoms.—The symptoms of disease of the pancreas are still more obscure than those of disease of the spleen. The enlargement which accompanies them is not readily distinguished from that of the adjoining viscera; and it is obviously very liable to be confounded with organic disease of the pylorus or duodenum. The symptoms generally present are a deep-seated obtuse pain in the epigastrium; nausea, sickness, and emaciation. To these may be added, as of occasional occurrence, constipation or diarrhœa, salivation, and jaundice.

Diagnosis.—It might be inferred from the function lately ascribed to the pancreas, that the disease would be distinguished by fatty stools. But more recent experiments have served to call in question the soundness of M. Bernard's opinion, and cases of pancreatic disease without fatty stools have been reported.

Treatment.—The treatment of supposed disease of the pancreas must be conducted on general principles, and must be so shaped as to meet the urgent symptoms that happen to be present. Fat and oily substances should, perhaps, be omitted from the diet.

DISEASES OF THE PERITONEUM.

Peritonitis . . .	Inflammation of the Peritoneum.
Ascites	Dropsy of the Abdomen.

PERITONITIS—INFLAMMATION OF THE PERITONEUM.

Symptoms.—After rigors, but, in some cases, without any preliminary symptoms, pain commencing in any part of the abdomen, and soon extending over the entire cavity, increased by pressure, and often so acute that even the weight of the bed-clothes is intolerable. The skin of the abdomen is hot; the pulse is in general small, hard, and contracted, though sometimes full and soft; the countenance is expressive of great suffering; the patient lies on his back with the thighs drawn upwards, and flexed on the abdomen; the bowels are constipated; the urine scanty and high-coloured; the tongue is white and covered with mucus, and soon becomes dry and brown, its edges and tip being red; the respiration is difficult, particularly during inspiration, and is chiefly performed by the ribs, as the diaphragm and abdominal muscles cannot act without increasing the pain. Nausea and vomiting are frequently present, and strangury sometimes. When the disease advances without control, it often terminates fatally within twenty-four or forty-eight hours, and death is preceded by typhoid symptoms, great prostration of the vital powers, sudden cessation of pain, sharpened countenance, distension of the abdomen by liquid or gas, vomiting of a coffee-coloured fluid, cold extremities, and coma.

When the disease attacks puerperal women, the pain commences in the region of the womb, the lochia are diminished and speedily suppressed, the breasts become collapsed, and the secretion of milk ceases. (See Puerperal Fevers, p. 301.)

When peritonitis occurs in consequence of perforation of the intestine, it is rapid and violent in its progress, and speedily causes death.

Morbid Appearances.—Injection of the vessels of the peritoneum; coagulable lymph spread over the surface, or flakes of lymph floating in serum or pus; false membranes binding the folds of the omentum, or the several viscera, together.

Causes.—Exposure to cold and fatigue; constipation, contusions, wounds, surgical operations; parturition; rupture of any of the abdominal viscera.

Prognosis.—*Favourable*, in peritonitis from common and transient causes. *Unfavourable*, in that produced by mechanical injury, organic disease; or rupture of the abdominal viscera.

Diagnosis.—From *rheumatism or neuralgic pains* of the abdominal muscles, by the pain in peritonitis being increased by pressure, whilst that seated in the muscles is relieved, or not increased, by steady pressure; also, by the presence of *severe* constitutional symptoms in peritonitis. From hysterical tenderness and pain, by the coexistence of spinal irritation, and by the less severe constitutional symptoms. The disease, in its early stage, may be distinguished by a feeling of crepitation under the hand, and a *to-and-fro* sound on applying the stethoscope while the abdominal parietes are in motion, as in the act of inspiration.

Treatment.—In recent and acute cases, prompt antiphlogistic treatment, consisting of general bleeding, followed by the application of leeches and fomentations, and the internal use of tartar-emetic combined with calomel and opium in full doses, and at short intervals, so as speedily to affect the system. In very severe cases, mercurial inunction may be employed at the same time. If much irritability of stomach is present, the tartar-emetic must be omitted, and calomel and opium must be given alone. In less severe cases, leeches to the abdomen, followed by warm fomentations, and calomel and opium internally.

In chronic cases, leeches in smaller numbers, calomel and opium, and stimulant embrocations to the abdomen, of which the best is hot turpentine. If great debility be present, these remedies must be combined with stimulants taken by the mouth, and administered in the form of enema.

After repeated doses of calomel and opium, castor-oil may be given in a half-ounce or ounce dose, and the large intestines may be relieved by enemata of warm water or warm gruel.

If there is painful tympanites or meteorism, we should employ stimulating enemata. The elastic tube should be introduced into the colon, by which the accumulated gas will rapidly escape, the diaphragm be allowed to descend, and the respiration to become free.

When effusion has taken place, and the febrile symptoms have abated, we must resort to the remedies for ascites. (See Ascites.)

ASCITES—DROPSY OF THE ABDOMEN.

Symptoms.—A progressive and uniform enlargement of the abdomen, accompanied, when the quantity of fluid is large, by tension of the parietes; dulness on percussion over the whole abdomen, when the fluid is abundant; and, when the quantity of fluid is small, over the part to which the position of the patient may cause it to subside, the rest of the abdomen being tympanitic; and a sense of fluctuation, becoming more and more distinct as the quantity of fluid increases.

The general symptoms which accompany ascites are due to the pressure exercised by the accumulated fluid, and in those cases in which ascites is merely a symptom of some other diseases, to the disease in question. The symptoms arising from the pressure of the fluid are the following:—difficulty of breathing; suffusion of the countenance, and injection of the eyes; and distension of the superficial veins of the abdomen. Thirst, a dry skin, scanty urine, and torpid bowels, are among the most common accompaniments of ascites.

The disease seldom continues long without inducing, or being accompanied by, an anasarcous state of the lower extremities.

Causes.—In addition to the general causes of dropsy (see Anasarca), certain diseases of the viscera of the chest and belly, leading to obstructed circulation; diseases of the liver (especially *cirrhose*, or the hobnail liver), diseases of the spleen, pancreas, or mesenteric glands; diseases of the heart or lungs; organic disease of the kidney; scarlatina; loss of tone in the peritoneum after pregnancy; chronic or subacute inflammation of the peritoneum, sometimes caused by cold; local injury.

Diagnosis.—From *encysted dropsy*, by the uniform enlargement and greater width of the abdomen, and, in recent cases, by the more distinct fluctuation; also, by the greater constitutional disturbance. From *tympanites*, by the dulness on percussion over the seat of the fluid, or over the greater part of the abdomen. From *the enlargement of pregnancy*, by the fluctuation being perceptible in the umbilical region, and the absence of the characteristic signs of the pregnant state. From *retention of urine*, by the coexistence in that disease of constant dribbling of water.

As the intestines generally contain some gas, the upper portion of the abdomen will generally yield a clear tympanitic sound, and the lower, or depending, portion of the abdomen a dull sound. The only exceptions to this rule are, when the distension is very great, or the intestines bound down by adhesions.

PROGNOSIS.—*Favourable.* The ascertained absence of organic disease of the viscera of the chest and abdomen. The urine healthy, in quality and quantity, and not coagulating by heat; moist skin; the swelling of the abdomen diminishing; the respiration becoming free; the strength little impaired.

Unfavourable.—Organic disease of the viscera of the chest or abdomen, especially of the liver; great emaciation; sympathetic fever; coma; an impaired constitution; previous bad habits of life, especially intemperance.

TREATMENT.—If pain and tenderness on pressure exist, leeches to the abdomen, followed by mercury so as to affect the mouth. If both are absent, the treatment must vary with the disease, of which the ascites is the effect. If disease of the liver, heart, lungs, or kidney, be present, the remedies appropriate to that disease. The remedies for the dropsy itself, irrespective of the causes which may have produced it, are bloodletting, diuretics, and drastic purgatives, unless contra-indicated by any of the existing symptoms. The class of diuretics to be preferred must depend partly upon the cause of the dropsy, and partly on the existing state of the patient.

After a fair trial has been given to those remedies which increase the natural secretions, if the pressure and tension of the abdomen become insupportable, recourse must be had to tapping of the abdomen.

In this, as in all other forms of dropsy, it is of the first importance to ascertain the causes of the dropsical effusion. This will generally consist in chronic visceral disease; and the treatment must vary with the nature of that disease.

Ascites is often combined with anasarca.

OVARIAN DROPSY—ENCYSTED DROPSY.

SYMPTOMS.—The *encysted dropsy* is seldom preceded, or in the first instance accompanied, by any cachectic state of the system; it is distinctly observed to begin in or near the iliac fossa on one side of the abdomen, whence it gradually diffuses itself throughout the whole cavity; the strength of the patient is long unimpaired, and the appetite and respiration continue good; until the bulk and pressure of the fluid bring on dyspnœa, and anasarca of the lower extremities.

CAUSES.—*Predisposing.* Age from puberty to the termination of the period of child-bearing.

Exciting.—Obscure.

DIAGNOSIS.—The pathognomonic symptom is the commencement on one side, and except when the disease is of long standing, and the accumulation of fluid considerable, an unequal enlargement of the abdomen. In the early stages, fluctuation is not perceptible, or it is much less marked than in ascites.

PROGNOSIS.—Unfavourable as to ultimate recovery, but the disease may continue for years without proving fatal; sometimes it runs a rapid course.

TREATMENT.—If there is pain or tenderness over the seat of the tumour, leeches, and antiphlogistic measures, and mercury to affect the gums. Except in this case, remedies are ineffectual, and the only chances of recovery are in a spontaneous cure by rupture of the cysts, and the discharge of the contained fluid by the intestines, bladder, vagina, or parietes of the abdomen; or in an operation. This may consist in simple puncture of the tumour, as in common ascites; or in puncture of the tumour, the discharge of the fluid, and the extraction of the sac; an operation which has more than once been performed with complete success.

ANASARCA—DROPSY OF THE FLESH.

SYMPTOMS.—The disease generally commences in the lower extremities, and first shows itself towards evening with a swelling of the feet and ankles, which disappears on assuming the recumbent posture. By degrees the swelling becomes permanent, ascends, and successively occupies the thighs, the integuments of the trunk of the body, of the penis and scrotum, and in females of the labia. In extreme cases the dropsical effusion extends to the upper extremities, and to the integuments of the face, neck, and chest. The parts occupied by the fluid *pit* on pressure with the finger. It is also often accompanied by ascites and hydrothorax. The urine is generally small in quantity, high-coloured, and deposits a reddish sediment; sometimes, however, it is of a pale whey colour, and more copious. The skin is generally pale and dry, and, when the effusion is in large quantity, it becomes tense and shining, and the water often oozes through the pores of the cuticle, or raises it in the form of small blisters, or a portion of the skin sloughs. The other symptoms vary with the cause of the dropsy, and the diseases with which it may happen to be combined. The symptoms most commonly present are dyspnœa, palpitation, flatulence, and drowsiness.

CAUSES.—*Predisposing.* All causes of debility.

Exciting.—Certain organic diseases, producing an obstruction to the free circulation of the blood, especially diseases of the heart, lungs, and kidneys (of diseases of the heart, dilatation of the right side; of diseases of the lungs, emphysema; of diseases of the kidney, acute desquamative nephritis, and fatty degeneration, are the most common causes of dropsy); suppression of customary evacuations; the sudden disappearance of cutaneous eruptions; abuse of spirituous liquors; common catarrh; the exanthemata, especially scarlatina; pressure on the veins of the extremities.

Diagnosis.—From *emphysema*, by the swelling in anasarca pitting on pressure; in emphysema, being elastic, and accompanied with crepitus.

Prognosis.—*Favourable.* The disease having been induced by causes which admit of easy removal, such as common cold; the strength little diminished; the constitution of the patient previously unimpaired; the appetite remaining entire.

Unfavourable.—Concomitant organic disease; great debility and emaciation.

Treatment.—The treatment of anasarca must vary with the cause. If it depend upon visceral disease, the treatment will be appropriate to that disease; if upon pressure, the compressing cause must be removed; if upon an inflammatory state of system, bleeding and other antiphlogistic remedies will be required. Diuretics may be employed where the kidneys are sound, but are contraindicated in renal dropsy. In such cases, drastic purgatives and diaphoretics are to be preferred.

Anasarca following scarlatina is of the inflammatory kind, and is generally accompanied by bloody or coagulable urine, and is best treated by leeches or cupping to the loins, the warm bath, saline aperients with digitalis, and diaphoretics. In this form of dropsy, as in all others, the urine must be examined, to ascertain the presence or absence of disease of the kidney. (See Diseases of the Kidney.)

If, in spite of remedies, the anasarca increases, and the legs are so swollen as to require immediate relief, the fluid must be let out by repeatedly introducing a common curved needle under the skin, taking care not to make the punctures too near together. In cases of great debility, and when the discharge of fluid takes place very rapidly, it may be expedient to keep up a uniform pressure by bandages.

CHAPTER V.

DISEASES OF THE URINARY ORGANS.

1. Diseases of the Kidney.
2. Diseases of the Bladder.

DISEASES OF THE KIDNEY.

Nephritis	Inflammation of the Kidney.
Granular Disease of the Kidney.	
Gravel.	
Urinary Calculus.	
Hæmaturia	Bloody Urine.
Ischuria Renalis	Suppression of Urine.
Diabetes	Immoderate flow of Urine.

NEPHRITIS—INFLAMMATION OF THE KIDNEY.

Synonym.—Desquamative nephritis (acute and chronic), named from the fibrinous, bloody, or purulent casts of the urinary tubes, which are discharged, blended with epithelium scales, in all cases of nephritis.

Symptoms.—Pain in the region of the kidney, extending along the course of the ureter to the neck of the bladder, to the groin or scrotum, frequently attended by retraction of the testicle, and numbness of the inside of the thigh. The pain is deep-seated, circumscribed, or diffuse, acute or dull, sometimes only felt upon pressure, but always increased by firm pressure, by the erect or sitting posture, by coughing, sneezing, or other strong expiratory movements, and sometimes even by the descent of the diaphragm in ordinary respiration. It is also increased by straightening or stretching the lower extremity on the affected side. Instinct directs the patient to avoid this, to incline to the affected side, and to bend the limb, thereby relaxing the muscles of the loins. Hence he lies on the affected side or back, and draws up one or both lower extremities. There are nausea and vomiting, frequent micturition, and dysuria, with partial or total suppression of urine. The urine which is passed is usually at first bloody, and coagulable by heat and acids; but after a time the blood disappears, and the urine becomes pale, watery, not coagulable, and either neutral or alkaline. Albumen is, however, sometimes present; but in those cases the inflammation is probably complicated with granular degeneration of the kidney. There is generally some degree of fever; the pulse is full, hard, and frequent at first, but becomes small as the disease advances; the tongue is covered with a white fur; there are constipation, tympanites, and wandering pains in the abdomen, with an anxious expression of countenance and depression of spirits.

TERMINATIONS.—In resolution; in abscess; or in gangrene; known by the ordinary symptoms that accompany these terminations of inflammation in other parts. Coma is one of the most common terminations.

MORBID APPEARANCES.—The inflamed kidney of a scarlet or crimson colour; sometimes enlarged, indurated, or infiltrated with pus. The ureters red, their mucous membrane thickened, and covered with pus; or adherent, so that their canal may be obliterated in some part of its course, above which the tube will be enlarged. This last appearance is often seen when a calculus is passing from the kidney to the bladder, and when it obstructs the ureter.

MICROSCOPIC APPEARANCES.—Fibrinous casts of the urinary tubes involving blood, or pus globules (see figures 27, 32, and 31, pp. 125-127).

CAUSES.—The common causes of inflammation; acrid diuretics; calculi or gravel in the uriniferous tubes, ureters, or bladder; external injury; long-continued and violent exercise of the muscles of the back, as in horse-exercise; collections of hardened fæces in the colon; retrocedent or atonic gout; diseases of the urethra, prostate gland, bladder, and ureters.

DIAGNOSIS.—From *lumbago*, by the pain being confined to one side, following the course of the ureter, not being increased by motion of the muscles, and being accompanied by numbness of the thigh and by retraction of the testicle; also by the accompanying urinary disorder.

It sometimes happens that nephritis is unaccompanied by pain in the kidney, while the stomach, the brain, or the bladder may exhibit all the signs of idiopathic disease.

PROGNOSIS.—*Favourable.* Remission of pain, fever, and tension, followed by a very copious excretion of high-coloured urine, mixed with mucus or pus; universal equable perspiration; hæmaturia, if succeeded by a remission of symptoms. The prognosis is generally favourable in idiopathic nephritis before the fifth day.

Unfavourable.—Severe rigors, and supervening hectic fever; sudden cessation of pain, hiccup, delirium, cold extremities.

TREATMENT.—*Indications.* I. To reduce the inflammation. II. To relieve the pain.

I. The first indication is fulfilled by, 1. General and local blood-letting; the latter, either by the use of cupping-glasses, or by the application of numerous leeches to the region of the kidney or perinæum.

2. Castor-oil to act upon the bowels, aided, if necessary, by warm emollient clysters. The castor-oil may be given in doses of half an ounce or an ounce, in combination with twenty or thirty drops of laudanum.

3. Mild diaphoretics, especially frequent and copious draughts of mucilaginous and diluent liquids, as barley-water, solution of gum-arabic, decoction of marsh-mallows, or linseed-tea with a little nitre.

II. The second indication is fulfilled by, 1. Clysters of laudanum and starch (ʒi. to Oss.), or an opium suppository (one or two grains of solid opium).

2. The warm hip-bath, repeated according to the violence of the pain; and fomentations to the region of the kidney.

3. Anodyne embrocations, as the camphorated oil and morphia applied over the region of the kidney, when the acute symptoms have abated.

In chronic cases an issue or seton should be inserted in the loins. In dyspeptic subjects, the tonic bitter infusions are indicated. The alkalis, as soda, potass, and lime-water, are useful, so long as the urine continues acid; and the mineral acids, so long as it is alkaline.

Blisters are contraindicated, because they frequently induce strangury, and thus increase the inflammation of the kidney.

Remedies.— In chronic cases, a decoction of the dried leaves of the amygdalus Persica, olive-oil, uva ursi, pareira brava, balsam of copaiba. Dry cupping to the loins.

In the treatment of acute nephritis, Dr. Christison recommends bleeding carried to syncope, followed by opium in the dose of two or three grains, or thirty or forty minims of the tincture. He has seen the disease "abruptly arrested in this way." (Libr. Pr. Med., vol. x.) It is important to direct the treatment, not to individual symptoms, but to the inflammation which causes them. Perfect rest should be enjoined, and during convalescence all violent exertions should be avoided. When there is retention of urine, it is important to make use of the catheter at stated periods.

GRANULAR DISEASE OF THE KIDNEY.

Symptoms.—The disease may be acute or chronic. The acute is ushered in by rigor followed by pyrexia. The urine is scanty or almost suppressed, occasionally bloody, and loaded with albumen; there is frequent micturition, dull pain in the loins, sometimes shooting to the groins or testicles; nausea, pain in the epigastrium increased by pressure, and, in some cases, vomiting. These symptoms are followed in one or two days by anasarca.

The *terminations* of the disease are various: sometimes it yields to active treatment; in other instances it subsides into the chronic form; in others, again, it leads to acute visceral disease, such as pleurisy, pericarditis ,peritonitis, or pneumonia. In those cases where the urine is very scanty, it frequently terminates in fatal coma.

The chronic form may commence with acute symptoms, or it may come on gradually and imperceptibly, the first marked symptoms being frequent micturition and debility. The patient also complains of obscure pains in the loins, increased by pressure; the urine is scanty or increased in quantity, of a cherry-red or brown colour, or of a muddy appearance, of low specific gravity, and coagulating more or less by the action of heat and nitric acid; the face is pale, the eyelids often œdematous, the skin dry, and there is nausea with urgent thirst. In this state the patient may remain for many months, or even for a few years, till at length some of the secondary disorders make their appearance. The most common of these are dropsy, acute and chronic visceral inflammation, diarrhœa, rheumatism, catarrh, diseased heart, and coma. When the disease proves fatal, death is usually preceded by coma.

DIAGNOSIS.—Of the *acute* form. "The only invariable character is scanty, highly-coagulable urine, with more or less fever."—Of the *chronic* form. "A reduction in the density of the urine, with diminution of its solids, excessive reduction of the colouring matter of the blood, and leucophlegmasia." (Christison.)

COMPLICATIONS AND TERMINATIONS.—Anasarca and ascites; bronchitis, diarrhœa, dyspepsia, constant vomiting; pleurisy, peritonitis, pericarditis, pneumonia; coma; chronic rheumatism; and organic diseases of the heart and liver.

PROGNOSIS.—Complete recovery is rare; and the disease is very apt to recur.—*Favourable*. The early stage or previous rare occurrence of the disease; absence of complications; gradual disappearance of albumen from the urine, and its increasing specific gravity; moisture of the skin.

Unfavourable. The reverse of these; suppression of urine; coma.

ANATOMICAL CHARACTERS.—The essence of this disease is an increase in the quantity of fat naturally existing in small proportion in the epithelium cells lining the urinary tubules. Bright's disease, therefore, must be regarded as a fatty degeneration of the kidney, bearing a close analogy with the fatty liver, with which, as well as with fatty deposit in the coats of the arteries, and on the valves of the heart, it is often found associated. The various appearances presented by the diseased kidney are due to the extent, rapidity, and duration of the morbid changes.

The following alterations in the size and structure of the kidneys are enumerated by Christison:—1. Congestion of the kidney with enlargement, and with or without deposition in its internal structure. 2. A granular deposition into its cortical and tubular textures, sometimes finely granular, sometimes roe-like, and attended with atrophy or absorption of the proper renal tissue. 3. Deposition of a homogeneous yellowish-gray matter, with similar atrophy. 4. Disseminated tubercles. 5. Induration of semi-cartilaginous hardness. 6. Atrophy, from disappearance of the proper renal structure, with little or no deposition. And, 7. Mere anæmia, or paleness.

MICROSCOPIC CHARACTERS.—In the early stage granular casts, composed of fibrin and disintegrated epithelium (fig. 28, p. 126). In an advanced stage similar casts entangling oil globules (fig. 30, p. 126).

CAUSES.—*Predisposing.* The scrofulous diathesis. It occurs in both sexes, and at all ages; at five, and even under, and so late as seventy-nine. (Christison.) Of seventy-four fatal cases recorded by Dr. Bright, nineteen were under thirty, fifty under fifty, thirteen above fifty, and four above sixty.

Exciting.—The impure air, and other unwholesome influences to which the poor inhabitants of large towns are exposed; intemperance; mechanical injuries; cold; a previous attack of scarlatina, followed by dropsy.

TREATMENT.—*Indications.* I. To preserve the health and strength by regulation of the diet, a pure atmosphere, and proper exercise, with tonic medicines. II. To relieve congestion of the kidney by strict attention to the functions of the skin and bowels, and by such moderate depletion as circumstances may demand.

In acute cases, when fever is present, bleeding may be necessary; and if there is severe pain in the loins, cupping. If dropsical effusions are present, they must be removed by purgatives and diaphoretics, diuretics being inadmissible. In the absence of diarrhœa, drastic purgatives, such as full doses of the compound jalap powder, may be given every morning, at the same time that Dover's powder, in five or ten-grain doses, is given two or three time a-day. A hot-air bath may be administered at intervals of one, two, or three days. The skin should be kept warm, and a nourishing but unstimulating diet should be prescribed.

When there is much debility, tonics or stimulants may be prescribed. A good stimulant diaphoretic, in such cases, is the liq. ammon. acet. in doses of an ounce, three or four times a-day.

In the treatment of complications, the nature of the existing disease of the kidney must be borne in mind, and the remedies appropriate to those complications, modified by the existing disease and state of system, must be prescribed.

REMEDIES.—Mercury? The abstinence from fat and oily substances, and from articles containing starch and sugar?

PROPHYLAXIS.—Temperance, pure air, a clean skin, plain and wholesome diet, and regular exercise in the open air, are particularly to be enforced in persons who have suffered, or seem liable to suffer, an attack of this disease.

GRAVEL.

SYMPTOMS.—Dull or acute pains, with a sense of heat and heaviness in the lumbar region, with more or less pain or difficulty in voiding the urine, increased by sudden and violent motion, with occasional pain behind the pubes, irritation at the neck of the bladder, and itching or pain at the extremity of the penis. Sometimes there is retraction of the testicles, with discharge of bloody urine, or of clots of blood. The urine, even while warm, contains a sandy powder, crystalline grains, or small calculi. It is generally rather scanty, high-coloured, of high specific gravity, acid, of a strong odour, and disposed to become turbid on cooling. The digestive organs are deranged; there is a sense of weight in the epigastrium, acidity of the stomach, with flatulence and frequent eructation; constipation; furred tongue; dry skin; restlessness; and feverishness.

The most common form of gravel consists of urate (lithate) of ammonia, with or without free uric acid (*red gravel*). Next to this in point of frequency, is pure uric acid. The ammoniaco-magnesian phosphate, or a mixture of this with amorphous phosphate of lime (*white gravel*), comes next in order; then the oxalate of lime. A mixture of these several sorts, and an alternation of the first and second, is not of uncommon occurrence. The other forms of gravel are rarely met with. For the mode of distinguishing these several varieties, see p. 127.

CAUSES.—*Predisposing*. Constitutional and hereditary peculiarities; the period of infancy, and from the age of forty upwards; high living; sedentary habits; gouty diathesis.

Exciting.—Cold; blows and injuries to the loins; dyspepsia; the use of water containing calcareous matters; acescent fruits. In the case of the oxalate of lime gravel, an excess of saccharine matters, and vegetables and fruits containing oxalic acid; organic disease of the kidney or bladder.

TREATMENT.—This varies with the species of gravel discharged. In the uric or lithic acid gravel, a diet chiefly vegetable, and in extreme cases strictly so; diluents; the alkaline bicarbonates, of which the bicarbonate of potash is to be preferred, in ten-grain doses, three or four times a-day, so long only as the urine has an acid reaction; gentle exercise; and a regular state of the bowels. The alkaline aërated waters, as those of Vichy and Carlsbad, are highly beneficial in this form of gravel.

When the phosphates are deposited, a more generous diet is admissible, with a moderate allowance of wine, and the mineral acids (the nitric, muriatic, or nitro-muriatic acid), properly diluted, should be given at short intervals. The same attention is also required to the state of the digestive organs, and to the general health. When the phosphatic diathesis has been brought about by exhaustion of mind or body, opium is indicated, and often proves extremely serviceable.

In the oxalic acid diathesis (for urine containing oxalate of lime is generally bright and clear, and the gravel is only to be detected by the microscope), the alkaline carbonates are indicated. All articles of food containing oxalic acid should be avoided, and saccharine substances should be taken in moderation, or, in extreme cases, disallowed. The patient should use soft water. Dr. Prout recommends mineral acids, especially the muriatic acid, combined with tonics, to be taken till the urate of ammonia shows itself in the urine.

In all forms of gravel, strict attention must be paid to the general health; to the functions of the skin, to the avoidance of sudden changes of temperature, and to the state of the digestive organs. Warm bathing is beneficial by promoting the action of the skin. Symptoms supervening on gravel must be treated by the remedies appropriate to such symptoms occurring independently of it. Thus, in addition to the treatment of acute and chronic nephritis and other diseases of the kidney already described, it will be sometimes necessary, in cases of gravel, to employ leeching, fomentations, warm baths, mucilaginous drinks, enemata, and low diet; and to enjoin rest of body and tranquillity of mind.

URINARY CALCULI.

SYMPTOMS.—These will vary with the situation of the calculus. When it is situate in the bladder or urethra, the case comes under the care of the surgeon; but when calculi are contained in the kidney or in the ureter, they are beyond the reach of surgical aid, and require medical treatment.

The symptoms of *calculus in the kidney* are those of gravel in its most severe form, or of nephritis—viz., pain in the loins, extending to the groin, testicle, or extremity of the penis, retraction of the testicle, painful and frequent micturition, and bloody urine. The pain is greatly increased by motion, and relieved by rest. There are nausea and vomiting, restlessness, and slight fever. These symptoms are often suddenly removed by the discharge of a small calculus, often accompanied or followed by that of a large deposit of gravel. The presence of this calculus in the kidney often leads to severe inflammation, and to those diseases of the kidney which are the result of it.

The symptoms of *Calculus in the Ureter.*—When a calculus is passing along the ureter (a fit of the gravel), there will be intense pain, or a dull pain along the affected ureter and spermatic cord on the same side, extending to the penis, the testicle, or the inside of the thighs. There is frequently great tenderness on a circumscribed spot of the abdomen, corresponding with the seat of the calculus. The patient is troubled with constant and often ineffectual calls to pass urine, which is tinged with blood. There are severe nausea and vomiting, with extreme anxiety and intense suffering. These symptoms may pass off suddenly, on the arrival of the calculus in the bladder, followed, in some cases, by its discharge from the urethra. In other instances, the calculus remains impacted in the ureter, leading to disease of the kidney, or giving rise to large accumulations of urine, and ultimate distension of the pelvis of the ureter, and of the walls of the kidney. In this manner, the kidney may be transformed into a kind of sac, which may fill the abdomen, contain an immense quantity of urine, and be mistaken for ascites.

TREATMENT.—To relieve the acute pains, a full dose of opium (two or three grains), or an equivalent dose of laudanum, or of morphia should be given, or an opiate enema, or suppository (ʒi. of laudanum in a small quantity of gruel, or two or three grains of solid opium), may be substituted, and is to be preferred when the stomach is very irritable. A warm bath, followed by fomentations to the abdomen and loins should also be prescribed, and if the pain is extremely acute, venæsection and leeches to the loins.

Calculus in the bladder is consigned to the surgeon, and relieved by the operations of lithotrity and lithotomy. The medical treatment will be that of the form of gravel which is voided by the patient.

HÆMATURIA—BLOODY URINE.

SYMPTOMS.—An evacuation of urine, mixed with blood, preceded, in many cases, when not the effect of injury, by pain and sense of weight in the region of the kidney.

CAUSES.—Inflammation of the kidney; Bright's disease; calculus in the kidney or bladder, or in its passage through the ureter or urethra; diseased prostate; a diseased state of the mucous membrane of the bladder; malignant fungous growths from the mucous membrane; external violence, or great exertion; the general causes of hæmorrhage; excessive venereal indulgence; cantharides or turpentine. Sometimes it occurs in the course of purpura nautica, or purpura hæmorrhagica; and at the close of severe febrile affections, accompanied by typhoid symptoms. A discharge of blood from the urethra is not an uncommon event in young inhabitants of the Mauritius.

Diagnosis.—Bloody urine is of a bright-red or dark-brown colour, and, if the quantity of blood is considerable, lets fall a dark-brown deposit, or contains distinct coagula. For the chemical and microscopical characters, see Part I., p. 122.

The source from which the blood flows may sometimes be inferred from the accompanying symptoms, and a careful examination of the urine. If the hæmorrhage is preceded by pain in the region of the kidney, if the blood is equally diffused through the urine, and if the urine, when examined by the microscope, is found to contain casts of the urinary tubes (see Part I., p. 127), the blood has come from the kidney. When the first quantity of urine discharged from the bladder is little, if at all, tinged with blood, and the remainder consists of blood or urine highly tinged with blood, there is a strong presumption that the hæmorrhage is from the bladder, especially if symptoms of stone are present. When the blood flows from the urethra without discharge of urine, there is every reason to believe the urethra to be the source of the hæmorrhage.

Treatment.—The treatment must be determined by the existing complications, or probable causes of the hæmorrhage. If the disease be the consequence of injury, or the patient be of a full plethoric habit, bleeding, or cupping to the loins, rest, and gentle aperients will be required.

If it arise from irritation of the kidney by calculus, together with the remedies proper for that disease, frequent draughts of mucilaginous liquids, as thick barley-water, solution of gum-acacia, decoction of marsh-mallows sweetened with honey, opium, and copious emollient clysters should be prescribed.

If the blood coagulates in the bladder, it gives rise to difficult micturition, and requires the use of the catheter. In such cases, the injection of warm water, decoction of marsh-mallows, or of poppies, by means of the double syringe, or a gum elastic bottle, is productive of great benefit.

When the hæmorrhage is excessive, cold water may be repeatedly injected into the bladder, or a cold solution of alum (℈i or ℈ii to the pint). Cold water may also be injected into the rectum. At the same time gallic acid, either pure, or as it exists in Ruspini's styptic (an alcoholic solution of the acid), or the extract of Krameria in scruple doses, may be given by the mouth. A decoction of gall-nuts, pomegranates, or logwood; or the uva ursi, kino, or catechu, may also be employed. Acetate of lead in combination with opium, and the tinctura ferri muriatis have also been recommended.

ISCHURIA RENALIS—SUPPRESSION OF URINE.

Synonym.—Anuria.

Symptoms.—Languor, restlessness, a sense of weariness and weight in the loins and lower extremities, frequent pulse, heat of skin, flushed face, headache, nausea, and vomiting. These symptoms are followed about the third day by drowsiness and œdema of the face, or by anasarca of the limbs and entire body. About the fourth day, coma sets in, and death takes place in two or three days more. At the onset of the disease, the bladder is found to contain a small quantity of muddy urine; but when the disease is fully formed, there is complete suppression.

In some cases of suppression of urine, there is no pain in the loins, no fever, or other symptoms, except slight nausea and drowsiness. During the second or third day the patient becomes comatose, and dies in from 24 to 30 hours. In some cases, the kidney continuing to secrete urine, the bladder is empty from some mechanical obstruction to the passage of the secretion through the ureters. In these cases the disease sets in with excruciating pain which at length subsides; and the patient becomes drowsy and dies comatose.

Causes.—Pre-existing disease of the kidney, excited into activity by blows or falls, or exposure to wet and cold. The action of certain poisons, as digitalis, corrosive sublimate, and cantharides. Acute inflammation of the kidney. Mechanical obstruction in the ureters.

Diagnosis.—From *retention of urine* by the empty state of the bladder as ascertained by the hand, and by the use of the catheter.

Prognosis.—The disease is fatal, if it does not soon yield to the remedies employed. In persons of advanced age, and who have been long subject to urinary disorders, the prognosis is extremely unfavourable.

Treatment.—*Indications.* I. To reduce existing inflammation, and so promote the secretion of urine. II. To relieve pain.

I. The first indication is fulfilled by bloodletting. Blood may be taken from the arm, or by cupping from the loins. Depletion may be followed by the warm bath, which has the additional advantage of relaxing the tissues in cases of suppression of urine dependent on mechanical obstruction.

II. The second indication is fulfilled by full doses of opium (two or three grains of solid opium, or ʒss. of laudanum, followed, if necessary, by smaller doses at intervals of three or four hours). Some relief is also obtained by hot fomentations to the seat of the pain.

If the bowels are confined, a full dose of castor-oil should be administered. This may be advantageously combined with laudanum.

(Ol. ricini ʒi. Tinct. opii ♏xx or ♏xxx.) When the kidneys have been previously diseased, cautious local depletion, with aperients and diaphoretics (Dover's powder in ten-grain doses, or Liq. ammon. acet. ʒss, with Tinct. opii ♏x or ♏xx), must be preferred to more active measures. When coma has set in, the disease is generally beyond the reach of remedies.

DIABETES—IMMODERATE FLOW OF URINE.

SPECIES.—1. *Diabetes insipidus*; with limpid urine not sweet.

2. *Diabetes mellitus*; with urine of the smell, colour, and taste of honey.

3. *Diabetes chylosus*; with urine containing chyle.

1. DIABETES INSIPIDUS.

SYNONYM.—Chronic diuresis.

SYMPTOMS.—Emaciation, debility, depression of spirits, anxious expression of countenance, thirst, gnawing sensations at the stomach, dyspepsia, white tongue, constipation, dry skin, irritable bladder, greatly increased secretion of urine.

The urine does not always present the same properties. In some cases, there is merely an increase of water, the other constituents retaining their normal proportion; in others, the urea is in defect; and in a third class of cases, in excess. To these three forms of diabetes insipidus (or, to speak more correctly, non-saccharine), Dr. Willis has given the names *Hydruria*, *Anazoturia*, and *Azoturia*. In the first and second variety, the urine is of very low density (in one case of the first form 1001.—(Christison); in the third variety, the density is high (commonly 1030 to 1035, but sometimes as low as 1020 to 1024).

CAUSES.—Excessive use of liquids, especially of spirituous liquors; hysteria; nervous excitement; granular disease of the kidney; irritation or disease of the bladder or urinary passages. The third variety is not uncommon in young children.

PROGNOSIS.—*Unfavourable*, when combined with disease of the kidneys. In other cases, it frequently yields to judicious treatment.

TREATMENT.—Moderate use of liquids; abstinence from all substances which possess a diuretic property; tonics, especially the mineral acids, and opium; diaphoretics, warm clothing, the warm bath; a nutritive diet. In the second form of the disease, a due proportion of animal food is necessary; but in the third, the diet should consist chiefly of vegetables. Occasional symptoms must be treated by appropriate remedies; when excitement of the circulation is present, moderate bleeding; when great restlessness, opium; in extreme debility, tonics or stimulants; if there is much irritability of the neck of the bladder, demulcents.

2. DIABETES MELLITUS.

SYMPTOMS.—The first symptom which attracts attention is frequent micturition. The urine, on being examined, is found excessive in quantity, of a pale straw colour, of a peculiar faint odour resembling hay, of a sweet taste, and containing sugar in greater or less quantity. There is inordinate appetite, generally accompanied by dyspeptic symptoms; excessive thirst; and constipation: the tongue is clammy, and red at the edge, or clean, or white with a brown streak down the middle; the gums are red and tender; the throat dry; the breath has often a sweetish odour, like that of hay; the skin is dry, harsh, and scaly. The patient is weak and loses flesh. The mind is generally affected, the power of attention being weakened, and the disposition being rendered melancholy, anxious, and irritable. After the disease has continued for some months, or even for several years, the symptoms continuing to increase, the emaciation becomes extreme, and the patient either dies exhausted, or falls a victim to some organic disease. Diabetes is often preceded by cutaneous affections, and accompanied by carbuncles.

RATIONALE.—A form of dyspepsia leading to the formation of sugar in the stomach, its absorption into the blood and elimination by the kidney, accompanied, in most cases, by a rapid waste of the existing structures of the body.

DIAGNOSIS.—From *other forms of diabetes,* by the saccharine quality of the urine. The other properties of the urine are thus described by Dr. Christison: " In the earliest period, it is not improbable that the urine is characterized by being above 1030 in density, high in colour, and abounding in urea as well as other natural ingredients. Most generally, when first carefully attended to, it is found very pale, scarcely urinous in its odour, little prone to become ammoniacal when long kept, high in density, excessive in quantity, defective in the proportion of urea, but not in its daily quantity; defective also in its proportion of earthy salts, and abounding in sugar, which communicates a sweet taste, and the property of fermenting with yeast. Should the case, however, have been previously for some time under proper treatment, then the colour of the urine is often less pale, its odour somewhat urinous, and, under long keeping, ammoniacal; its quantity is not so excessive, yet still always superabundant, especially considering its high density; the proportion of urea more abundant, its daily quantity excessive: and sugar also present, though frequently it is not to be detected by the sense of taste. As the disease advances, the influence of the treatment here laid down ceases to be so manifest; and less favourable characters previously mentioned recur; and not unfrequently there is also some albumen, which may be separated by coagulation with heat. Lastly, towards the close, where death does not arise from immediate or secondary disorders, the natural condition of the urine is often observed to be restored for a week or even upwards; the quantity, colour, odour, and density being much the same as in health, the urea in the natural proportion, the sugar wanting, and the chief deviation observed from ordinary urine being, that putrefaction ensues with unusual speed." For the mode of detecting sugar in the urine, and of ascertaining its quantity, see Part I., p. 120, and the tables at pages 128, 129.

ANATOMICAL CHARACTERS.—The kidneys generally larger than in health, gorged with blood, flabby, with all the vessels and ducts enlarged. Granular degeneration is sometimes found as a complication.

COMPLICATIONS AND SECONDARY DISORDERS. — Tubercular phthisis is the most common complication; granular degeneration of the kidney; peritoneal inflammation; anasarca; apoplexy.

PROGNOSIS.—*Favourable.* Short previous duration of the disease, urine not exceeding 12 pints in quantity and 1036 in density; the emaciation not considerable; the appetite and thirst not inordinate; the skin still perspirable; and the mind not much depressed. When the patient is under treatment, the signs of improvement are diminution of the quantity of the urine, without increase, or with diminution of density, steady diminution in the quantity of solids discharged by urine, increase of weight, diminished appetite and thirst, the skin becoming softer, the eye brighter, the mind clearer and more cheerful, and the body stronger and more active.

Unfavourable.—Prolonged duration of the disease, great emaciation, prostration of strength, urine profuse and of high density, the solids discharged greatly exceeding the solids contained in the food, intense thirst, inordinate craving for food, the supervention of other diseases, great and sudden prostration of strength.

CAUSES.—*Predisposing.* Hereditary predisposition.

Exciting.—Cold; drinking cold water when the body is heated; intemperance; distress of mind.

TREATMENT.—*Indications.* I. To improve the digestion. II. To diminish, as much as possible, the sources whence sugar can be supplied to the urine. III. To diminish the secretion of urine. IV. To relieve urgent symptoms.

I. The digestion may be improved by the administration of tonic infusions, carminatives, and other remedies applicable to dyspepsia, (see Dyspepsia).

II. The second indication is fulfilled by a strict regulation of the diet, which should consist principally of animal food, broiled or roasted, with a small quantity of stale and well-fermented bread, (16 ounces of bread, and 20 ounces of uncooked meat.—Christison,) and liquids in moderate quantity: of these, the best are weak beef or mutton tea, milk, pure spring water, or water holding calcareous salts in solution. These should be taken in small quantities at a time, and warm. Gluten bread may be substituted with advantage for common bread.

III. The third indication is answered by reducing the quantity of liquid; by forbidding the use of tea, of spirituous liquors, of acidulated drinks, and of saline aperients; in fact, of all articles of diet or medicine which have diuretic properties; by increasing the secretion of the skin, by warm baths, Dover's powder, friction, and warm clothing; by opium in repeated moderate doses, as five grains of Dover's powder, three times a-day; and by astringent remedies, such as sulphate of zinc and acetate of lead.

IV. When there is much fever present, bloodletting may be had recourse to; pain in the epigastrium may be relieved by a few leeches; anasarca may be treated by drastic purgatives; affections of the chest by local depletion, counter-irritation, and sedative expectorants; constipation by resinous purgatives; and debility, when it is extreme, must be met by tonics and stimulants.

In one case which was for some time under my care, a young female continued for months to pass large quantities of saccharine urine without losing flesh or suffering in health. She took no medicine, except a simple tonic infusion, and continued, though not very strictly, a diet containing an excess of animal food. It is evident that no part of the sugar was formed at the expense of the structures of the body. So long as a patient does not lose flesh, it is probably inexpedient to adopt any other treatment. (G.)

Remedies.—Small and repeated bleedings; hot-air bath; steel; opium; creosote, as recommended by Dr. Watson.

3. DIABETES CHYLOSUS.

Symptoms.—These sometimes resemble those of diabetes mellitus; at others, they are very slight, and the patient suffers little inconvenience. The urine is generally abundant, of a milky appearance, and varying in density from 1010 to 1020. A short time after its discharge, it sometimes coagulates into a white gelatinous substance, and after a longer interval, separates into a clear yellowish fluid and a white clot; at other times a white flaky matter is deposited; or a white cream rises to the surface. The substance which gives this character to the urine approaches in its properties those of fibrin or casein. The disease is of rare occurrence, and of slight importance.

Causes.—Obscure. Luxurious living, cold, fatigue, mercury, and long residence in hot climates have been mentioned among the causes.

Treatment.—Does not admit of removal; but it may be palliated by bloodletting, spare living, diaphoretics, anodynes, and laxatives.

DISEASES OF THE BLADDER.

Cystitis	Inflammation of the Bladder.
Enuresis	Incontinence of Urine.
Dysuria	Difficulty in voiding the Urine.

CYSTITIS—INFLAMMATION OF THE BLADDER.

Species.—1. Acute; 2. Chronic.

1. ACUTE CYSTITIS.

Symptoms.—Pyrexia; acute pain, swelling and tension in the region of the bladder; pain and soreness, increased upon pressure above the pubes, or in the perinæum; frequent micturition, painful discharge of urine, in small quantities; or complete obstruction to its passage; tenesmus; vomiting.

Causes.—Mechanical injury; falls on the abdomen when the bladder is distended; local irritation by calculi; the inflammation of gonorrhœa extended along the urethra; spasmodic or permanent stricture; all the usual causes of inflammation; cantharides; stimulant urethral injections; cold (catarrhus vesicæ).

Treatment.—The *indications* in the *acute* species are the same as in the other phlegmasiæ, and are to be fulfilled nearly in the same way:—

1. By general bloodletting, and by the application of leeches to the perinæum, or region of the pubes.
2. By oleaginous purges and emollient clysters.
3. By the warm bath and fomentations.
4. By the exhibition of opium with diaphoretics. (Pulv. ipecac. c. gr. x., or Liq. ammon. acet. ℥ss., with Tinct. opii ♏ x or ♏ xv, every night, followed by castor-oil every morning.)

2. CHRONIC CYSTITIS.

Symptoms.—The chronic form consists in the discharge of an increased quantity of mucus with the urine, with slight symptoms of irritation in the bladder.

Treatment.—The treatment consists in the use of remedies which act as stimulants to the mucous membrane, such as the uva ursi, cubebs, copaiba, black pepper, &c. Such remedies, however, are only applicable to simple chronic inflammation, or catarrh of the bladder.

Chronic inflammation of the bladder may depend on fungus or ulceration of the organ, on stricture at its neck, or on disease of the prostate gland, ureters, or kidneys. When it attacks aged persons, and especially the intemperate, it often proves fatal. When persons above the age of fifty are infected with blenorrhagia, or, as it was formerly termed, gonorrhœa, the inflammation frequently extends along the whole urethra, to the neck of the bladder, and to the mucous membrane of the organ. Such persons complain of pain in the loins, bladder, and urethra, suffer intense pain, and are frequently destroyed by acute or chronic inflammation of the bladder, or of some other portion of the urinary organs.

In these cases, emollient or slightly-stimulating injections, varying in quantity, according to the capacity of the bladder, should be passed into the bladder, by means of an elastic gum bottle and catheter, twice a-day. Civiale, Costello, and Heurteloup, prefer decoction of marshmallows with laudanum. It is important that the feet be kept warm. For the symptoms and treatment of spasm of the bladder, irritable bladder, diseased prostate, stricture of the urethra, &c., consult works on Surgery.

ENURESIS—INCONTINENCE OF URINE.

Incontinence of urine may arise from mechanical causes, or from functional derangements of the bladder. The former class of cases falls under the care of the surgeon; the latter may be cured by medicines, and therefore comes within the province of the physician.

Causes.—Incontinence of urine, without organic defect, may arise from one of two causes; from violent contraction of the muscular coat of the bladder, the sphincter possessing its usual power; or, from debility of the sphincter, the muscular coat of the bladder contracting with its usual force. In the first case, there is generally some source of irritation within the bladder itself, but in rare instances the muscular fibres are thrown into a state of spasm without obvious cause. The first form of disease is most common in males; the second in females and young children.

Treatment.—In incontinence of urine arising from spasm of the muscular coat of the bladder, the most effectual remedies are narcotics or sedatives, administered by the mouth, or introduced into the rectum, in the form of suppository or enema. A grain of solid opium as a suppository, or half a drachm of laudanum in a starch injection, will generally succeed in relieving the spasm. In severe cases, the warm bath, cupping to the loins, or counter-irritants, must be resorted to.

In incontinence of urine arising from debility of the sphincter (a form of disease which is common in young children, leading to frequent micturition in the day, and an involuntary discharge of urine at night), two or three drops of tincture of cantharides, with ten drops of tincture of hyoscyamus, increased gradually and cautiously, rarely fail of removing the disease. (I have had several cases of this kind, which have received immediate benefit and a speedy cure from this mode of treatment. In one case, occurring in a young adult, after cantharides had failed, tinctura ferri muriatis, in the dose of ʒ ss. three times a-day, effected a speedy cure. G.)

When the urine is perfectly retained during the day, and voided only at night, the disease is rather the effect of habit or sloth, or the result of dreams, than of any debility of the sphincter muscles: and here it may be necessary to resort to other means; such as obliging the child to leave its bed about midnight for the purpose of emptying the bladder, preventing him from drinking liquid in the evening, threatening punishment, or, if all other means fail, keeping up a certain degree of pressure upon the urethra by means of a bougie bound along the under part of the penis.

DYSURIA—DIFFICULTY IN VOIDING THE URINE.

Dysuria may exist in every degree, from slight and momentary arrest of the flow of urine, with or without pain, to complete retention. Some degree of pain generally attends the abortive attempts to discharge the urine, and in severe cases the suffering is intense.

Causes.—The causes are very numerous, such as long retention of the urine, acrimony of the urine itself, or irritation or inflammation of the coats of the bladder, whether originating in the bladder itself, or from causes external to it. Thus, dysuria is one of the symptoms of gonorrhœa, of inflamed prostate gland, of gravel, of urinary calculus, of cystitis and nephritis, of inflamed hæmorrhoids, of inflammation of the rectum, or irritation of it by worms or scybala, of uterine affections, of pregnancy, &c. *Strangury*, an aggravated form of dysuria, is produced by cantharides and other strong irritants. Dysuria is also a symptom of hysteria, and is apt to occur in nervous persons of both sexes. Mechanical impediment to the passage of urine through the urethra, as in stricture, also occasions dysuria.

Treatment.—This must depend on the cause. Mechanical obstructions must, for the most part, be removed by mechanical means; existing causes of irritation, whether within the bladder or external to it, must be removed, if possible, by the same means; inflammation, where it exists, must be subdued; and the spasmodic action of the muscles must be relieved by narcotics and sedatives.

Among the causes of dysuria, which are external to the bladder, constipation is the most common; and a brisk purgative, or a proper course of aperients, will soon remove the disease. A suitable purgative in such cases consists of castor-oil ℥i., Tinct. opii ♏ xx or ♏ xxx.

When there is spasm of the muscular coat, it will be necessary to employ the warm bath and opiate suppositories or enemata. The tincture of the muriate of iron in repeated doses, and the cold effusion to the pelvis and thighs, are also powerful remedies where spasm is present.

When the urine is scanty and acrid, diuretics and diluents will be required. Dysuriaf ollowing long retention of urine is best relieved by the warm bath.

CHAPTER VI.

DISEASES OF THE FEMALE ORGANS OF GENERATION.

AMENORRHŒA	Suspended Menstruation.
DYSMENORRHŒA	Painful Menstruation.
MENORRHAGIA	Excessive Menstruation.
LEUCORRHŒA	The Whites.
HYSTERALGIA	Irritable Uterus.
METRITIS	Inflammation of the Uterus.

AMENORRHŒA—SUSPENDED MENSTRUATION.

SPECIES.—1. Amenorrhœa with plethora; 2. Amenorrhœa with anæmia or chlorosis.

1. AMENORRHŒA WITH PLETHORA.

The general symptoms are those of plethora, and the constitutional treatment that which is recommended under that head. (See Plethora, p. 224.) When blood is abstracted, it should be taken away at the approach of the menstrual period.

2. AMENORRHŒA WITH ANÆMIA OR CHLOROSIS.

For a description of the constitutional symptoms and treatment of anæmia and chlorosis, see Simple Chronic Anæmia, p. 227, and Cachectic Chronic Anæmia, or Chlorosis, p. 228. Amenorrhœa may be the cause or the consequence of constitutional debility, or, perhaps, to speak more correctly, the suspension of the menstrual discharge is, in some cases, the first of the train of symptoms constituting anæmia and chlorosis, whilst, in other instances, it makes its appearance where symptoms of debility have already existed for a considerable period. In either case, the existing malady is strongly indicated by the appearance of the countenance, which is either pale and transparent, as if from mere loss of blood; or waxen, sallow, and muddy, as in well-marked chlorosis. In the first case, the general symptoms are those of debility and languid circulation; in the latter, of debility with a cachectic state of the constitution: in the first form, the secretions are but little deranged; in the last, they deviate more widely from their natural character. Hence, the former class of cases will be found to require a less careful attention to the state of the secretions than the latter; steel is necessary in both, but purgatives and alteratives will often be unnecessary in anæmia, while they will be as strongly indicated in chlorosis. In addition to the general treatment laid down under those heads, it is sometimes deemed necessary to prescribe measures for the restoration of the menstrual discharge. The principal of these measures are the warm hip-bath, at the expected period, aloetic purgatives, electricity, and the remedies styled emmenagogues, of which the chief are savin, hellebore, ergot of rye, and strychnine. Leeches are also applied to the vulva, groins, or breasts, at the menstrual period, with the same view.

Amenorrhœa is sometimes accompanied by vicarious discharges of blood, or of blood slightly altered from its usual character, from the nose, lungs, stomach, or rectum, and from ulcers of the skin. These vicarious discharges, if occurring in important organs of the economy, may require medical interference, and are best treated by bloodletting and purging practised a little before the expected period of their occurrence.

The *complications* of amenorrhœa, which are extremely numerous, must be treated by remedies appropriate to those complications, combined with such as restore strength to the system, and tend to reestablish the menstrual discharge

DYSMENORRHŒA—PAINFUL MENSTRUATION.

Symptoms.—Pain in the loins preceding the menstrual period by a few hours or days; tenderness on pressure in the hypogastric region, and sometimes over a considerable extent of the abdomen; sense of soreness or acute darting pains, resembling those of colic, and occurring mostly in paroxysms; vomiting; diarrhœa with tenesmus; dysuria. The nervous system is generally more or less affected, and hysteria in a variety of forms is often present. These symptoms increase in severity until the appearance of the menstrual discharge, and then suddenly cease or gradually pass off. The discharge is often, but not always, scanty, and is sometimes accompanied by a tenacious secretion which takes the shape of the internal surface of the uterus.

Causes.—*Predisposing.* Plethora; the nervous temperament.

Exciting.—Sudden and violent emotions; increased determination of blood to the uterus; sexual intercourse, immediately before the expected flux; all causes which diminish the discharge; irritation from neighbouring parts, as constipation, which is a very frequent concomitant and cause; spinal irritation.

Prognosis.—*Favourable.* The majority of cases admit of cure, but a few resist treatment, and continue till the cessation of the menstrual discharge.

TREATMENT.—*Indications.* I. To relieve the urgent symptoms during the menstrual period. II. To prevent their return by medicines administered in the interval.

I. The first indication is fulfilled, where there is plethora, by the application of leeches to the vulva, or cupping-glasses to the loins; by tepid, hot, or vapour-baths; and by opium in full doses. Laudanum and tartarized antimony in minute doses, frequently repeated, and stramonium, are strongly recommended by Dr. Fergusson. (See Libr. Pr. Med., Art. Disordered Menstruation.) Colchicum, acetate of ammonia, ergot of rye, and many other remedies, have been proposed. The general remedies to be relied on are anodynes, depletions, and warm applications.

II. The second indication is fulfilled by a careful attention to the functions of the stomach and bowels, moderate depletion to meet any irregular determination of blood, and steel in full doses.

MENORRHAGIA—IMMODERATE FLOW OF THE MENSES.

A flow of the menses is to be considered as immoderate, when it either returns more frequently than what is natural, continues longer than ordinary, or is more abundant than is usual with the same person at other times.

It may be the effect of two different and opposite states of the system;—plethora with inordinate arterial vigour; and general relaxation or debility.

SYMPTOMS.—An immoderate flow of the menses, arising from plethora, is usually preceded by rigors, acute pains in the head and loins, turgid flushed countenance, universal heat, and a strong, hard pulse; on the contrary, where the symptoms of debility are prevalent, the pulse is small and feeble, the face pallid, the respiration short and hurried on the slightest effort; there are dull aching pains in the back and loins, and the group of nervous symptoms described under Mimosis Inquieta. (See p. 232.)

CAUSES.—*Predisposing.* Plethora; a laxity or debility of the womb, arising from frequent parturition; difficult and tedious labours, or repeated miscarriages; a sedentary and inactive life; indulging much in grief and despondency; living upon a poor, low diet; drinking freely of warm enervating liquors, such as tea and coffee; and living in heated apartments.

The exciting causes of menorrhagia are, violent exercise, as in dancing; blows or concussions of the belly; strains; violent straining at stool; tight lacing, or other mechanical impediments to the free circulation of the blood; passions of the mind; excess in venery, particularly during menstruation; the application of wet and cold to the feet; organic affections of the uterus, such as scirrhus, polypus, &c. Attacks of menorrhagia are of common occurrence in women who have changed life some months or years previously.

PROGNOSIS.—*Favourable*, especially when it is the effect of plethora; but when it occurs in habits much reduced by previous disease, or is produced by a laxity of the vessels of the organ, is profuse, long-continued, or of frequent recurrence, it will often resist treatment for a long time. When it arises from an organic affection of the part, which is frequently the case after the age of forty-five, it is usually incurable.

TREATMENT.—The treatment of menorrhagia consists in—

1. Reducing the febrile symptoms when urgent, by general blood-letting, and the means recommended against inflammatory fever; strictly confining the patient to the horizontal posture; and avoiding every exertion both of body and mind.

2. Keeping the body gently open with laxative medicines, such as the sulphate of magnesia in infusion of roses, with an excess of acid, and the addition of twenty drops of tincture of henbane.

4. Administering draughts of acidulated cold liquors frequently, as infusion of roses, lemonade, and the like.

4. The internal use of styptics, especially the acetate of lead, as directed against hæmoptysis, when the febrile symptoms are subdued. The muriated tincture of iron is extremely valuable as an astringent. It may be given in combination with the infusion of quassia. (℞. Tinct. ferri sesquichloridi ♏ xx or ♏ xxx, Infus. quassiæ ℥ i., to be taken three times a-day.)

5. When symptoms of debility are present, tonic astringents; quinine, cinchona, cascarilla, kino, quercus; and wine.

6. In severe cases, the constant application of astringents to the vagina and hypogastric region; especially ice, very cold water, or vinegar and water; or injections, consisting of equal parts of the liquor aluminis compositus and water, will be beneficial, or ice may be passed into the vagina.

In acute and recent cases, more active remedies will be required than in the chronic form of the disease, in which more moderate measures continued during a considerable period are indicated. In these cases, the combination of tonics and sedatives, recommended in Mimosis Inquieta (p. 233), should be prescribed.

LEUCORRHŒA—THE WHITES.

This term was originally applied to a white discharge, consisting of mucus; but it is now applied to any discharge, arising from merely functional causes, whether the colour be white, yellow, greenish, brown, or slightly red.

SYMPTOMS.—The discharge varies in consistence from a limpid fluid to that of a tenacious ropy mucus, and in quantity from a slight increase of the natural secretion of the part to several ounces in the day. The general health is liable to suffer in a variety of ways. The stomach is generally more or less deranged; the bowels are constipated, or extremely irritable; spinal irritation is often present, and there is pleurodyne, palpitation, and the long train of nervous symptoms described under Mimosis Inquieta (p. 232). Pain in the left side is a very common symptom in leucorrhœa, but it is by no means peculiar to this disease.

CAUSES.—*Predisposing.* Debility, chlorosis, luxurious living, warm rooms.

Exciting. Over-excitement of the uterine system; obstruction to the circulation; irritation propagated from neighbouring parts, as from the rectum, or reflected from the spinal marrow. The disease occurs at all ages from 15 to 50, and is not uncommon in children under puberty.

TREATMENT.—It is necessary first to ascertain that organic local disease is absent. The indications then are—I. To improve the general health. II. To arrest the discharge.

I. The general health may be improved by the ordinary means, by strict attention to the diet, and to the state of the bowels, which should be kept free by purgatives regularly administered, by regular hours, change of air, cold bathing, &c. The most useful remedy is steel in full doses or chalybeate waters; or a combination of tonics and sedatives, as recommended under Mimosis Inquieta (p. 233).

II. For the discharge itself many remedies are recommended. In many cases, an alum or zinc injection is sufficient; in some instances, however, the stronger astringents may be necessary, as catechu, cinchona, oak-bark, tannin, or the rind of the pomegranate. Stimulants may sometimes be required, as ammonia, lunar caustic, or lapis infernalis (gr. x. to ℥i. of water, *Ricord*). These substances may be used as a wash, or in the form of injection, or they may be introduced into the vagina by means of a cylindrical pessary of sponge. When much irritability is present, opiate injections may be required; and if there is much congestion, or if there are signs of local inflammation, a few leeches may be applied to the neck of the uterus.

The remedies which act on the mucous membrane through the general system are cubebs, copaiba, cantharides, turpentine, alum, and uva ursi.

HYSTERALGIA—IRRITABLE UTERUS.

Symptoms.—Pain in the loins and round the brim of the pelvis, coming on in paroxysms, and increased by exercise or strong mental emotion. The suffering, which is of the most severe kind, generally comes on a few days before or after the menstrual period. It is relieved by the horizontal posture. Pressure on the neck of the uterus gives rise to great pain, and the cervix is found, on examination, puffy and swollen. The general health suffers from the continuance of the pain, and by the confinement which it occasions; the circulation becomes languid, and there are dyspepsia and constipation, and the group of nervous symptoms which constitute Mimosis Inquieta (p. 232).

Causes.—*Predisposing*. The nervous temperament; the period of youth and middle age; previous attacks of dysmenorrhœa.

Exciting. Undue exertion; long standing, when the catamenia are present; uterine irritation from whatever cause; spinal irritation.

Diagnosis.—From *dysmenorrhœa*, by the suffering being constant; from *prolapsus*, by the pain being merely relieved, but not removed, by the recumbent posture; from *metritis*, by the absence of enlargement, heat, or throbbing, and by the stationary nature of the complaint. The coexistence of other nervous affections, of spinal irritation, of hysteric symptoms, and the peculiarly nervous temperament, will materially aid the diagnosis.

Prognosis.—The disease does not endanger life, but often continues unabated for a long period.

Treatment.—*Indications*. I. To subdue local pain. II. To improve the general health.

I. The first indication is fulfilled by rest in the horizontal posture; by the belladonna plaster, or opiate embrocation to the spine; by injections into the vagina of acetate of morphia (two to four grains in the ounce of distilled water—*Fergusson*); the warm hip-bath, or the steam-bath; anodynes or sedatives internally, and cautious depletion.

It is most important to examine the spine, as spinal irritation is very apt to coexist. In this case, the tartar-emetic ointment rubbed into the back is of great service. (G.)

II. The general health must be improved by a generous diet, fresh air, and moderate exercise; and if the patient can bear it, by a course of steel and gentle aperients. All causes of debility, such as depletion, active purgatives, and confinement to close rooms, must be avoided.

METRITIS—INFLAMMATION OF THE UTERUS.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE METRITIS.

SYMPTOMS.—Pain, increased by pressure, in the region of the uterus, and in the cervix on examination per vaginam; pain extending to the loins and thighs; dysuria; a sense of weight and bearing down; swelling of the abdomen and tympanites. These local symptoms are generally accompanied by fever, with nausea and vomiting; and sometimes there are symptoms of hysteria. In the most severe cases, the fever is followed by head symptoms, as slight delirium, impaired vision, and a tendency to coma, with extreme prostration of strength and subsultus tendinum.

ANATOMICAL CHARACTERS.—The disease may attack the peritoneal or mucous coats alone, or it may involve the substance of the organ. The morbid appearances in the membranes are those of inflammation of the serous and mucous membranes in other parts of the body. When the substance is inflamed, the uterus becomes enlarged, œdematous, and softened; in severe cases, pus is infiltrated through its tissue; or an abscess is formed in it. Purulent matter may also be found in the veins and absorbents. This is most commonly the case in puerperal inflammation of the uterus.

CAUSES.—*Predisposing.* Those of inflammation generally.

Exciting. Suppression or diminution of the menstrual discharge from cold; the use of astringent injections; mental emotions; frequent sexual intercourse; physical injuries; blows and falls; childbirth.

TREATMENT.—The ordinary antiphlogistic measures; general and local depletion, by cupping to the loins, or by leeches to the vulva or groins; or a combination of calomel, opium, and tartar-emetic in full doses; local fomentations; the hip-bath; counter-irritation by mustard poultices or hot turpentine. The dysury may be relieved by mucilaginous drinks, and the bowels should be kept free by gentle saline aperients, or by castor-oil.

2. CHRONIC METRITIS.

This is a common consequence of the acute form, when neglected or badly treated. It may assume a variety of shapes, and lead to a great number of severe structural lesions of the uterus. The most common consequences are ulceration, suppuration, membranous inflammation, and enlargement and induration of the mucous follicles and structure of the organ. For a full account of these forms of disease, the reader is referred to works on this class of diseases. (For a short and concise account of them, see Libr. Pr. Med. Art. Inflammation of the Uterus, by Dr. Simpson.)

CHAPTER VII.

DISEASES OF THE ORGANS OF SENSE.

1. Diseases of the Eye.
2. Diseases of the Ear.

DISEASES OF THE EYE.

1. CONJUNCTIVITIS	Inflammation of the Conjunctiva.
2. SCLEROTITIS	Inflammation of the Sclerotica.
3. CORNEITIS	Inflammation of the Cornea.
4. IRITIS	Inflammation of the Iris.
5. CHOROIDITIS	Inflammation of the Choroid.
6. RETINITIS	Inflammation of the Retina.
7. AMAUROSIS	Nervous blindness.

INFLAMMATION OF THE CONJUNCTIVA.

Species.—1. Catarrhal Ophthalmia; 2. Purulent Ophthalmia of Infants; 3. Purulent Ophthalmia of Adults; 4. Gonorrhœal Ophthalmia; 5. Strumous Ophthalmia.

1. CATARRHAL OPHTHALMIA.

Symptoms.—Redness and itching of the conjunctiva, lacrymation, some intolerance of light, and stiffness of the globe of the eye, followed by pricking pain, the sensation of a foreign body (as a grain of sand) beneath the eyelid, and the gluing together of the eyelashes, especially on first waking in the morning. The redness first shows itself on the conjunctiva of the lids, and gradually extends towards the cornea. It is evidently superficial, of a bright red colour, and in the form of irregular clusters of tortuous vessels. In acute forms of the disease, the whole eye is covered with a net-work of vessels, the secretion thickens and becomes puriform or muco-purulent, and patches of extravasated blood are effused beneath the conjunctiva. If the disease extend to the conjunctiva covering the cornea, the vision is obscured. There is little or no constitutional disturbance, beyond the slight feverishness attendant upon a common cold, when the disease is due to that cause.

CAUSES.—Catarrh; a draft of cold air directed on the eye; the presence of foreign bodies; over-exertion of the eye; exposure to a strong light; all the causes of inflammation in other mucous membranes.

DIAGNOSIS.—From *purulent ophthalmia*, except in severe cases, by its milder character, and by its not being contagious. From *inflammation of the sclerotic*, by the brighter colour, larger size, and more tortuous course of the vessels, which are obviously superficial, and can be made to shift their place by the motions of the eyelids; by the muco-purulent or purulent secretion; by the absence of acute pain in and around the orbit, and by the slight intolerance of light, existing chiefly at the onset of the attack. The superficial, bright, tortuous vessels of the conjunctiva, contrasted with the deeper-seated, straight, violet-coloured, radiating vessels of the sclerotic, remove all difficulty from the diagnosis.

PROGNOSIS.—*Favourable.* It is a disease which readily yields to treatment, and when confined to the conjunctiva, does not threaten the loss of vision. In chronic cases, or after repeated attacks, the lids may become thickened, and that part of the membrane which covers the cornea may be rendered opaque, so as to impair the sight.

TREATMENT.—When the disease is strictly local, local remedies alone are required. If it depend on catarrh, and is attended with febrile symptoms, the treatment proper to catarrh must be employed. Dover's powder, in doses proportional to the age (10 grains for the adult), may be given at night, with a saline aperient in the morning. If the disease, though due to a local cause, should, from its severity, affect the circulation, small doses of tartar-emetic, in combination with a saline aperient, may be given two or three times a-day; and the antiphlogistic regimen may be adopted. General bloodletting will rarely, if ever, be required.

The *local* treatment will consist, in the more severe cases, of cupping or leeches to the temple, and scarification of the lids, with warm fomentations, such as decoction of poppies, applied by means of soft flannel or sponge. When the inflammation has in some degree subsided, and in cases of less severity, from the first, collyria containing the acetate of lead, the sulphate of zinc, the sulphate of copper, or the nitrate of silver, must be prescribed. Of these, the last is to be preferred, in the proportion of four grains to the fluid ounce of distilled water. A large drop of the solution is to be introduced into the inner angle of the eye, one, two, or three times a-day. The rest of the treatment consists in the introduction of a small portion of spermaceti or zinc ointment between the eyelids at bed-time, to prevent them from adhering during the night.

2. PURULENT OPHTHALMIA OF CHILDREN.

SYMPTOMS.—Inflammation in the conjunctiva covering the lids, commencing generally on the third day after birth, and extending gradually over the entire surface of the eye, accompanied by intolerance of light, firm adhesion of the lids, swelling of the eyelids, and a copious discharge of purulent matter, which is pent up by the adhesion of the lids, and issues in large quantities on their separation. There is occasional eversion of the eyelids, during the cries or struggles of the child, or when an attempt is made to separate them, and the membrane is seen of a bright scarlet colour. The discharge is generally yellow, but sometimes greenish, or it is tinged with blood; occasionally it is ichorous. The disease may continue for eight or ten days, without involving the transparent parts of the eye; but about the twelfth day, if it is not properly treated, purulent infiltration and consequent opacity of the cornea may take place; or ulceration, with protrusion of the iris; or adhesion of the iris to the cornea. The usual constitutional symptoms are restlessness, sleeplessness, a furred tongue, and disordered bowels,—the results of the prolonged local irritation.

DIAGNOSIS.—There is no other disease of the eyes occurring at this early period with which it can be confounded.

PROGNOSIS.—*Favourable*, so long as the cornea retains its transparency. Ulceration of the cornea, according to its degree, threatens injury to, or complete loss of, vision.

CAUSES.—The application of leucorrhœal or gonorrhœal discharge to the eye, during parturition; contagion; the common causes of inflammation ?

TREATMENT.—In severe cases, a single leech applied to the upper eyelid, followed by the frequent use of a collyrium, containing one grain of bichloride of mercury, in ℥viii. of distilled water, or a solution of from four to ten grains of alum, or four grains of nitrate of silver in an ounce of distilled water. In the more chronic forms of the disease, stronger stimulants may be used; and if the lids present a granular appearance, they may be touched with the solid nitrate of silver or sulphate of copper.

In milder cases, a little simple ointment placed between the lids; a collyrium containing four or five grains of sulphate of zinc or of alum to the ounce of distilled water, injected beneath the lids several times in the day; and gentle aperients of castor-oil, magnesia, or manna, to keep the bowels free.

In consequence of the contagious nature of the disease, the greatest care should be enjoined on the mother or nurse, to prevent the application of the matter to the eyes of other persons.

3. PURULENT OPHTHALMIA OF ADULTS.

Synonym.—Ægyptian ophthalmia.

Symptoms.—Intense inflammation of the conjunctiva, beginning for the most part suddenly, affecting generally both eyes, accompanied by profuse purulent discharge, and tending to involve the deeper-seated structures of the eye—are the characteristics of this disease. It generally sets in with a sensation of a foreign body beneath the eyelids, speedily followed by injection of the vessels of the conjunctiva, and effusion of serum beneath it, with a discharge of a thick, puriform matter from the surface. The conjunctiva is of a bright red colour throughout, the lids and anterior surface of the eye are swollen and granular, and the cornea is sunk, as it were, into a deep pit formed by the projection of the conjunctiva. The swelling is mixed here and there with extravasated blood. So long as the conjunctiva alone suffers, the pain is inconsiderable; but when the deeper-seated texture are involved, the pain is extremely severe, and is felt in the globe of the eye, and around the orbit. In the globe itself it is a sensation of painful tension, and around the orbit it is often allied to hemicrania. It is intermittent, or aggravated at intervals, and attains its greatest intensity at night. There is but little intolerance of light in any form of the disease. Rupture of the cornea sometimes takes place, with permanent or temporary relief of the pain. The constitutional symptoms are not strongly marked; the pulse is somewhat increased in frequency, the tongue is coated, and the sleep disturbed by paroxysms of pain.

Terminations.—In resolution; chronic inflammation of the conjunctiva; granular conjunctiva; opacity, ulceration, or sloughing of the cornea; staphyloma; prolapsis of the iris. The disease is very apt to recur.

Causes.—Contagion. The common causes of inflammation?

Diagnosis.—From *catarrhal ophthalmia* by the greater severity of all the symptoms, and the greater tendency to implication of the deeper-seated parts; when the disease attacks those parts, by the intensity of the pain in and around the orbit. From diseases affecting the deeper-seated tissues alone, by the presence of severe inflammation of the conjunctiva.

Prognosis.—*Unfavourable*, when very severe, or neglected in its commencement. From its tendency to attack the deeper-seated structures of the eye, loss of vision, or at least, injury to the sight, may be anticipated. The prognosis should, therefore, be guarded.

Treatment.—Venæsection to fainting, followed, if the inflammation is unusually severe, by the application of from twelve to twenty-four leeches around the orbit; free scarification of the membrane, followed by the application of strong astringents, of which the best is the nitrate of silver ointment of Mr. Guthrie (ten grains of nitrate of silver to ℥i. of lard). The solid nitrate of silver, a solution of the same containing ten grains to the ounce, the undiluted liquor plumbi acetatis, oil of turpentine, and other strong stimulants, have been recommended. In chronic cases, the vinum opii may be used with advantage. Previous to the application of any of these substances, the surface of the eye should be carefully cleansed by a syringe. Aperients should be administered at the outset; the patient should be put on a spare diet, and enjoined to take exercise in the open air. When the deeper-seated textures of the eye are implicated, the remedies appropriate to the inflammations of those textures should be employed; such as the belladonna ointment in threatened adhesion of the iris; puncturing the cornea to prevent the rupture of the membrane; the application of the nitrate of silver to ulcers on the cornea, or to the protruding iris.

As the disease is highly contagious, great care should be taken to prevent the application of the matter to the eyes of healthy persons.

4. GONORRHŒAL OPHTHALMIA.

Symptoms and Treatment.—Those of purulent ophthalmia of adults.

Causes.—Inoculation of the eye with gonorrhœal matter. Metastasis?

5. STRUMOUS OPHTHALMIA.

Synonyms.—Scrofulous, pustular, and phlyctenular ophthalmia.

Symptoms.—This disease attacks children from the period of weaning, to eight or nine years of age, and sometimes up to the period of puberty. There is a slight and partial redness of one eye, or of both eyes, sometimes confined to the eyelids, and in the form of groups of enlarged vessels running from the circumference of the eye to the edge of the cornea, where they terminate in small pustules, which break and form minute ulcers. Sometimes the injection extends to the conjunctival covering of the cornea, and pustules are formed upon its surface. There is great intolerance of light, the eyebrows are contracted, and the nostrils and upper lip drawn upwards. There is a profuse flow of scalding tears, whenever the eye is exposed to light, which flowing over the skin, irritate and inflame it, and sometimes give rise to a pustular eruption, accompanied by white scabs—the *crusta lactea.* The symptoms remit towards evening. The constitutional symptoms are those present in other forms of scrofula, such as glandular enlargements, eruptions on the head and face, sore ears, general debility, tumid belly, disordered bowels, offensive breath. The marks of the scrofulous diathesis are also generally present.

CAUSES.—*Predisposing.* The scrofulous diathesis, and all the circumstances calculated to call it into action.

Exciting. The common causes of inflammation; catarrhal ophthalmia; the exanthemata.

DIAGNOSIS.—From catarrhal ophthalmia, by the more partial injection of the vessels, the greater intolerance of light, the formation of distinct pustules, and the presence of other symptoms of scrofula. From purulent ophthalmia, by its less severity and more chronic course, the absence of acute pain in and about the eye, and the age at which it occurs; the purulent ophthalmia of children occurring soon after birth, and up to the time of weaning, and the purulent ophthalmia of adults, after puberty, while strumous ophthalmia occurs in the interval between weaning and puberty.

PROGNOSIS.—*Favourable,* where the constitution is but slightly affected with scrofula; but *unfavourable,* when the strumous taint is strongly marked.

TERMINATIONS.—In resolution; in the formation of a "vascular speck," or of *pannus*; in ulceration of the cornea, followed in some cases by protrusion of the iris, and its adhesion to the cornea; in infiltration of the cornea.

TREATMENT.—*Indications.* I. To improve the general health. II. To restore the vessels of the eye to their natural state.

I. The first indication consists in the treatment recommended for scrofula. See Scrofula (p. 306). Experience seems to point out quinine as the most valuable tonic in this disease.

II. The second indication is fulfilled by warm fomentations to the eye; by vinum opii dropped two or three times a-day into the eye; or by the use of any of the astringent collyria, with the red precipitate or citrine ointment, placed between the lids at bed-time; and by counter-irritation, as by blisters behind the ear, by an issue in the arm, or by a ring or thread passed through the lobe of the ear. If there is ulceration of the cornea, the edges of the ulcers may be touched by nitrate of silver. The crusta lactea may be removed by a bread poultice, followed by a lotion containing a scruple of sulphate of zinc to an ounce of distilled water.

SCLEROTITIS—INFLAMMATION OF THE SCLEROTIC.

SYNONYM.—Rheumatic ophthalmia.

This disease is sometimes found uncombined with inflammation of the surrounding textures, but more frequently it is complicated with more or less inflammation of the conjunctiva (*catarrho-rheumatic ophthalmia*), or with inflammation of the iris.

SYMPTOMS.—Bright redness of the globe of the eye, especially around the cornea, where the straight vessels of the sclerotic are seen arranged as radii, extending a short distance over the margin of the cornea, and there abruptly terminating. There is an abundant flow of tears, intolerance of light, varying in degree with the severity of the other symptoms; a sensation of fulness and tension, with darting pains in the globe, extending to the parts around the orbit, in the course of the branches of the fifth pair of nerves, increasing towards evening, attaining its greatest intensity at midnight, and subsiding towards morning. There is generally some degree of haziness of the cornea, and vision is more or less impaired.

TERMINATION.—In recovery, or in chronic disease; and if the disease extend to the cornea, or iris, the results of inflammation of those parts.

CAUSES.—*Predisposing*. Middle age; the male sex; a previous attack of the same disease; the rheumatic or gouty diathesis.

Exciting. The common causes of inflammation. The disease is in itself a form of rheumatism.

DIAGNOSIS.—From inflammation of the conjunctiva by the deep-seated redness and radiated arrangement of the vessels; by the secretion of tears in the place of mucus; by the deep-seated pain of the orbit, extending to the surrounding parts; by the intolerance of light; in some cases, by its complication with iritis.

PROGNOSIS.—*Favourable*, if the disease is promptly treated. It is very liable to assume a chronic form, and to return.

TREATMENT.—In acute cases, venæsection to the approach of fainting, repeated, if necessary, and followed by the free application of leeches to the temple or forehead; warm opiate fomentations and frictions; counter-irritants, with blisters to the temple, or a liniment consisting of equal parts of laudanum and tinct. lyttæ, rubbed frequently into the temple and forehead. The extract of belladonna is also to be applied during the whole course of the disease. The bowels should be freely acted on by mercurial preparations, as by hyd. chloridi, gr. iv., pulv. opii, gr. i., every night, followed the next morning by a saline aperient, or by a full dose of castor-oil. During the day, the vinum colchici may be given in doses of from ʒss. to ʒiss. every four or six hours, combined with ten drops of laudanum, and a gentle saline aperient. If administered in this combination, the morning aperient will be unnecessary, and the dose of calomel at night may be diminished, or suspended altogether.

In the chronic form of the disease, the vinum opii may be dropped into the eye, and tonics may be given, such as the disulphate of quinine, the mineral acids, or the tonic infusions. In obstinate cases, the arsenical solution, in doses of eight to twelve drops three times a-day, is strongly recommended by Dr. Mackenzie.

CATARRHO—RHEUMATIC OPHTHALMIA.

The symptoms, terminations, and treatment of this disease are those of catarrhal inflammation of the conjunctiva, combined with rheumatic inflammation of the sclerotic. The treatment must necessarily vary as the one or the other disease predominates.

CORNEITIS—INFLAMMATION OF THE CORNEA.

CHARACTER.—A chronic disease of the structure of the cornea, occurring generally in persons of a scrofulous habit.

SYMPTOMS.—The disease begins with a slight haze on the cornea, which gradually increases till it amounts to opacity. Numerous minute ulcers now form on the surface, and the vessels of the conjunctiva and sclerotic become injected; those of the former membrane ramifying over the surface of the cornea, and giving rise, in extreme cases, to the appearance known as "pannus," and those of the sclerotic being arranged in the characteristic radiated form around the margin of the cornea. Depositions of lymph between the layers of the cornea are also of frequent occurrence; and the secretion of the aqueous humour being augmented increases the convexity of the membrane. Other complications are apt to occur as the inflammation extends to the surrounding textures of the eye. There is generally but slight intolerance of light, accompanied by lacrymation. The pain is also slight, except occasionally in the first stage, when there is experienced a sense of tension in the eye, with darting pains in the forehead.

DIAGNOSIS.—From other chronic affections of the eye, by its limited seat; from the more severe diseases of the organ, by its chronic course.

Prognosis.—Generally unfavourable, especially when the general health is much impaired.

Causes.—*Predisposing.* Age, from eight to eighteen; strumous diathesis.
Exciting. The common causes of inflammation.

Treatment.—In the early stage, local depletion, repeated occasionally in the course of the malady; counter-irritation; and warm anodyne fomentations: astringent applications when the disease has become chronic: the pupil to be kept under the influence of belladonna. The constitutional treatment is that adapted to other forms of scrofulous affection. Quinine is particularly useful in this, as in strumous ophthalmia. Should inflammation of the surrounding textures, as of the iris, take place, the treatment proper to iritis will become necessary. (See Iritis.)

IRITIS—INFLAMMATION OF THE IRIS.

Species.—1. Acute; 2. Chronic.

Sub-species.—Idiopathic; Rheumatic; Arthritic; Syphilitic; Strumous.

I. ACUTE IRITIS.

Symptoms.—The disease begins by the formation of a red zone of small, straight, parallel vessels, arranged as radii round the circumference of the cornea, and terminating abruptly near its edge, the redness after a time extending to the conjunctiva. The iris soon loses its brilliancy and colour, and becomes muddy, and of a tint formed by blending a red with its original hue; the fibrous texture is at the same time impaired or destroyed, and lymph is largely effused into its substance, thrown out from its edge, or deposited upon its anterior or posterior surface, or in all these situations. Sometimes the quantity of lymph effused is so large as to fill the chambers of the eye. The movements of the iris are at first impeded, and then altogether suspended; the pupil contracts, and becomes irregular in shape, from effusion into its substance and adhesion to surrounding parts. There is dimness, and at length complete loss, of vision. There is generally severe pain in the globe and around the orbit, darting to the cheek and temple, and aggravated at night. The local symptoms are in the most severe cases accompanied by acute fever.

Diagnosis.—The diagnostic marks of this disease are, the change of colour, and the altered texture of the iris; the irregularity of the pupil; and the effusion of lymph behind the cornea. The peculiar arrangement of the vessels of the sclerotic is common to iritis and sclerotitis.

PROGNOSIS.—*Unfavourable*, in the more severe cases, and when the treatment has been delayed. *Favourable*, in milder cases, and in acute cases when promptly treated. A contracted pupil, great vascularity, acute and deep-seated pain, and greatly diminished sensibility or total insensibility to light, are very unfavourable symptoms.

CAUSES.—*Predisposing*. Gout, rheumatism, syphilitic affections, and scrofula.

Exciting. Mechanical injuries, surgical operations, over-exertion of the eyes, and the common causes of inflammation.

TREATMENT.—*Indications*. I. To subdue inflammation. II. To promote the absorption of effused lymph. III. To prevent the formation of adhesions.

I. General and free venæsection, repeated as often as necessary, and followed, when the more severe symptoms have been subdued, by the local abstraction of blood by cupping or leeches, brisk aperients, a strict antiphlogistic regimen, the exclusion of light, and perfect rest.

II. To fulfil the second indication, and at the same time to prevent the effusion of lymph, mercury must be given from the outset. It should be in the form of calomel, in a dose of two, three, or four grains, combined with from a quarter to half a grain of opium, every three, four, or six hours, according to the severity of the symptoms. In very severe cases it may be well to resort to mercurial inunction. The calomel and opium may be advantageously combined with tartar-emetic in the dose of from one-sixth to one-quarter of a grain.

III. To prevent the formation of adhesions, the extract of belladonna should be applied to the eyebrow and lids once in twenty-four hours.

REMEDIES.—Oil of turpentine in the dose of a drachm three times a-day. (Dr. Carmichael, of Dublin.) The following is his formula: —℞. Ol. terebinth. rectif. ℥ i.; vitell. unius ovi; tere simul, et adde gradatim mist. amygd. ℥ iv.; syrupi aurantii ℥ ii.; tr. lavand. comp. ℥ ss.; ol. cinnamomi, gtt. iii. vel. iv. Misce; sumat coch. magna ij ter die.

2. CHRONIC IRITIS.

SYMPTOMS.—The symptoms are those of the acute form, in a less degree of severity, and extending over a longer space of time. The indications for treatment are the same, but our measures will be more or less active according to the severity of the existing symptoms.

SYPHILITIC IRITIS.—The *symptoms* of this disease nearly resemble those of idiopathic iritis, but they generally make their appearance slowly and insidiously, and are more apt to be overlooked at the commencement. When fully established, this disease, like the more acute forms of it, may prove highly destructive to the eye. In some cases the symptoms from the beginning are those of acute iritis. The *cause* is, as the name implies, the venereal taint. The disease sometimes occurs alone; at others, in combination with other secondary symptoms; and it may make its appearance during the existence of the primary disorder. It does not occur in children. The *diagnosis* turns on the position in which the lymph is effused, and on its appearance. It is thrown out on the margin of the iris in the form of globules or distinct masses, of a reddish, brownish, or brownish-yellow colour, which are sometimes described as tubercles. At the same time there is displacement of the pupil upwards and inwards, the sclerotic zone is of a cinnamon colour, and small brown spots form on the cornea. The *treatment* is that of idiopathic iritis—abstraction of blood, general or local, mercury to affect the gums, and the extract of belladonna applied to the eyelids, so as to dilate the pupil.

Rheumatic Iritis.—The *symptoms* are those of idiopathic iritis, and the treatment in the acute stage will be the same. When the acute symptoms have subsided, or in the more chronic forms, disulphate of quinine, or the preparations of colchicum may be administered with advantage. The patient should be careful to avoid exposure to cold. Warm fomentations and hot compresses of linen are found to give relief in this form of iritis. Counter-irritation also is extremely useful; and stimulant local applications, as the vinum opii, dropped into the eye, have been recommended in the decline of the disorder.

Arthritic Iritis.—This disease is apt to occur in persons subject to gout, or of gouty constitutions, especially after repeated attacks of gout, or when weakened by abstinence, or any occasional debilitating cause. The *symptoms* bear a general resemblance to those of idiopathic iritis, and in the majority of cases they are those of the acute form. The sclerotic, however, has a peculiar purplish hue, and the radiating vessels stop within one or two lines of the margin of the cornea, leaving a bluish-white ring around that membrane, appearances which are characteristic of this affection. The disease is very apt to recur. The *treatment* in acute forms of the disease differs from that of acute idiopathic iritis, inasmuch as salivation is less beneficial and often injurious; preparations of colchicum should therefore be substituted for those of mercury, depletion having been previously practised, according to the severity of the disease and the state of the patient's constitution. The disulphate of quinine, Fowler's solution, and the sesquioxide of iron, have also been recommended. The diet should be carefully regulated, and abstinence from stimulating articles of food and drink must be enjoined. Warmth locally applied, whether dry or moist, and opiate frictions to the forehead and temple complete the treatment.

Strumous Iritis.—This disease is generally the result of an extension of strumous ophthalmia to the deeper-seated structures, and is a chronic and obstinate form of the disease. The constitutional treatment is that of other forms of scrofula: the local treatment will be determined by the degree and extent of the existing inflammation. The application of extract of belladonna must be substituted for local stimulants, and topical bleeding and counter-irritants may be necessary.

CHOROIDITIS—INFLAMMATION OF THE CHOROID.

Symptoms.—Inflammation of this membrane rarely exists alone, and when it begins in it, it speedily extends to the other deeper-seated structures of the eye. The pathognomonic symptom of the disease is the formation of a blue zone, of variable width, around the cornea, followed by the protrusion of small dark-blue tumours, varying in size and situation, and accompanied by displacement or contraction of the pupil, narrowing of the iris, and opacity of the cornea. There are great pain and intolerance of light, and vision is variously affected in consequence of the pressure on the retina; dimness of vision and actual blindness often supervene early in the disease. The constitutional symptoms are generally inconsiderable.

Terminations.—Enlargement of the globe of the eye; watery effusion between the choroid and the retina; absorption of the vitreous humour; inflammation and suppuration of the globe; choroid staphyloma.

Causes.—*Predisposing.* The strumous habit; adult age; female sex.

Exciting. Injuries, and the common causes of inflammation.

Diagnosis.—The blue zone around the cornea, followed by the bluish protrusions through the sclerotic, form the pathognomonic symptoms of the disease.

Prognosis.—Generally unfavourable. There is great danger of the sight being lost or permanently injured.

Treatment.—General followed by local bloodletting, mercurial aperients, preparations of antimony, the warm bath, and the antiphlogistic regimen. In the chronic form of the disease, Fowler's solution, in the dose of five or six drops three times a-day, with some tonic infusion. Counter-irritation by blisters, the tinctura lyttæ, or the tartar-emetic ointment; puncture of the sclerotic and choroid, to evacuate the serous effusion.

RETINITIS—INFLAMMATION OF THE RETINA.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE RETINA.

SYMPTOMS.—Acute, deep-seated pain in the globe of the eye, increased by motion or pressure, and extending to the brow; headache; intolerance of light; dimness or loss of vision, with shining spectra of various forms; contracted and motionless pupil. These symptoms sometimes supervene on inflammation of the other textures of the eye; but they may be followed by it. The pain in the eye and head is often succeeded by delirium, and it is attended with febrile excitement. The disease is rapid in its progress, and if not promptly treated, is attended with great danger to vision.

TERMINATIONS.—In general inflammation of the entire globe, or of the several structures of the eye, which inflammation is followed by the usual consequences of those diseases.

DIAGNOSIS.—The history of the complaint, with the symptoms mentioned in the foregoing description, will serve to distinguish simple retinitis from other simple diseases of the eye. The diagnosis is more difficult when the inflammation of the retina is complicated with that of other textures.

PROGNOSIS.—In simple acute retinitis, favourable, but guarded. In the complicated form of the disease it must vary with the nature of the complications.

CAUSES.—Strong light; the light and heat of large fires; the light reflected from the snow or sand; flashes of lightning; overstraining of the eye in the use of the microscope.

TREATMENT.—Copious abstraction of blood from the arm, followed, if necessary, by leeches round the eye; the antiphlogistic regimen; calomel and opium, given so as to affect the mouth. In complicated cases the treatment will vary with the nature of the other structures affected. The eye to be shaded from the light.

2. CHRONIC INFLAMMATION OF THE RETINA.

SYMPTOMS.—Those of the acute form in a less degree—pain less acute, some intolerance of light, dimness of vision, bright, dark, or coloured spots before the eye, contraction of the pupil, and sluggish movements of the retina.

CAUSES.—Constant exercise of the eye on minute or dimly illuminated objects; protracted use of the organ. The abuse of spirituous liquors? Onanism.

Treatment.—Moderate depletion by leeches or cupping to the temples, counter-irritation, a careful regulation of the diet, aperients and alteratives, an abstinence from the exciting cause, shading the eye from the light.

AMAUROSIS—NERVOUS BLINDNESS.

Synonym.—Gutta serena.

Varieties.—1. Inflammatory amaurosis (see Retinitis); 2. Anæmic amaurosis; 3. Hysteric amaurosis; 4. Dyspeptic amaurosis; 5. Amaurosis from disease of the brain, or injury to the nerves of the eye.

Symptoms.—Blindness, partial or complete, in one or both eyes. When both eyes are affected, the gait of the patient becomes peculiar. His movements are uncertain, the expression of countenance vacant, the eyeballs either fixed or oscillating, his gaze fixed on vacancy, the pupil generally dilated and insensible to light, but sometimes moveable, both its independent and associated movements being perfectly performed.

Diagnosis.—From blindness, the effect of disease of the transparent textures of the eye, by the perfect clearness and transparency of the pupil.

Treatment.—This must vary with the cause. As the seat of the disease is not an object of sense, the cause of it must be inferred from the history of the patient. If he has been exposed to any of the causes of inflammation of the retina mentioned under *retinitis*, bleeding, followed by calomel and opium, with antiphlogistic remedies, and perfect rest of the organ, must be resorted to; if there is evidence of unusual fulness of blood, especially in the vessels of the head and face, and the blindness, if partial, is increased by all causes which increase that determination of blood, bleeding and low diet must be prescribed, with a view of reducing existing plethora. If the disease supervene on hæmorrhage, hyperlactation, or other long-continued debilitating discharges, the treatment must be that indicated by such a state of system. Hysterical amaurosis, occurring, without other apparent cause, in females subject to hysteric fits, hysteric aphonia, or other anomalous disorders of the nervous system, must be treated as hysteria. When amaurosis is referable to dyspepsia, worms, or other gastric or intestinal irritation, the treatment must be directed to the condition of the alimentary canal, and to remove the exciting cause. Amaurosis dependent upon disease of the brain, or on irritation of the retina or branches of the fifth pair of nerves, may be occasionally cured by removing the cause. Blindness has, in one reported case, been cured by the removal of a carious tooth, into which a spicula of wood had been introduced, and occasionally it has disappeared under a course of mercury: amaurosis, apparently depending upon pressure within the brain, has been cured by salivation.

The treatment of amaurosis then must depend upon the cause, which can be known only by a careful consideration of all the circumstances, and of the previous history of the case. In chronic cases, and in the ascertained absence of inflammation of the retina, electricity or strychnine may be resorted to. The electric fluid may be applied by means of sparks drawn from the eyelids and parts around the orbit, and the strychnine may be sprinkled on a blistered surface above the brow, beginning with a sixth of a grain, and increasing the quantity gradually and cautiously.

DISEASES OF THE EAR.

1. Otitis Externa . .	Inflammation of the External Ear.
2. Otitis Interna . .	Inflammation of the Internal Ear.

OTITIS EXTERNA—INFLAMMATION OF THE EXTERNAL EAR.

Species.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE EXTERNAL EAR.

Symptoms.—Pain in the auditory canal, gradually increasing in severity, and augmented by cold, pressure, and the motions of the jaw; deafness; noises in the ear; redness and swelling of the lining membrane; and after an interval of a few hours, or of one or two days, a thin acrid fetid discharge, often tinged with blood, and at length becoming puriform. The inflammation is followed by enlargement of the mucous follicles, and terminates by suppuration, ulceration, and the formation of scabs, or of painful granulations.

Terminations.—In resolution, or in the chronic form, accompanied by chronic deafness.

Causes.—*Predisposing.* Childhood; the scrofulous diathesis.

Exciting. Cold; the introduction of foreign bodies into the ear; chemical irritants; the stings of insects; the sudden suppression of eruptions of the scalp or face; the extension of inflammation from surrounding parts; the exanthemata.

Treatment.—Poultices and warm fomentations to the ear; the injection of warm water, either pure or containing from five to ten grains of acetate of lead to the ounce; in severe cases, leeches behind the ear, blisters or tartar-emetic ointment over the mastoid process; aperients, tartar-emetic in nauseating doses; a spare diet and antiphlogistic remedies. If an abscess should form, poultices and warm fomentations, to promote suppuration and encourage the discharge.

2. CHRONIC INFLAMMATION OF THE EXTERNAL EAR.

Symptoms.—The same as in acute otitis; but less severe, and of long continuance.

Treatment.—If the disease is still recent, and the acute stage has only partially subsided, injections of warm water, or of a weak solution of acetate of lead, should be used several times in the day, for several days together, followed by weak astringents, such as solutions of alum, sulphate of zinc, and nitrate of silver, gradually and cautiously increasing their strength. If there are granulations of the mucous membrane, tents of lint or cotton, dipped in a solution of acetate of lead or sulphate of zinc, may be introduced into the meatus. The general treatment will consist in the steady use of aperients and alteratives, nourishing diet, pure air, and cleanliness; and if there is much debility, tonics, of which steel is the best. If the discharge should suddenly cease, and symptoms of head affection occur, hot poultices and fomentations should be applied to the external ear, at the same time that the head affection is met by appropriate remedies.

OTITIS INTERNA—INFLAMMATION OF THE INTERNAL EAR.

Species.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE INTERNAL EAR.

Symptoms.—Acute, deep-seated pain in the ear, accompanied by pain of the head and face of the same side, and increased by mastication; a sense of tension in the ear; loud noises; deafness; sometimes swelling of the tonsils, and sense of tension, with dull pain or itching at the back of the throat. There is a frequent, quick, and hard pulse, hot skin, anxious countenance, furred tongue, anorexia, general febrile excitement, restlessness, sleeplessness, and, in very severe cases, delirium and convulsions.

Terminations.—In resolution, with gradual subsidence of the symptoms; in suppuration, accompanied by throbbing pain and sense of extreme tension, followed by a discharge of matter by the external meatus, the membrana tympani having been ruptured, or through the Eustachian tube into the throat, or through an opening in the mastoid process.

CAUSES.—Those of inflammation of the external ear; the extension of inflammation from the back of the throat through the Eustachian tube.

DIAGNOSIS.—From inflammation of the external ear by the deeper-seated pain, the absence of discharge from the external meatus in the early stage of the disease, and the results of an examination of the external ear. The rupture of the membrana tympani may be recognised by causing the patient to expire forcibly, the mouth and nostrils being closed, when air will issue from the external opening of the ear.

PROGNOSIS.—Deafness is a very common consequence of this disease. Inflammation extending to the dura mater, and other membranes of the brain, is an occasional consequence. Hence the importance of a guarded prognosis.

TREATMENT.—Bleeding, followed by cupping or leeches behind the ear, and counter-irritation, by blisters or tartar-emetic ointment, brisk purgatives, and nauseating doses of tartar-emetic. If there is reason to believe that suppuration has taken place, and there is extreme tension, with throbbing pain in the ear, and violent headache and delirium, instantaneous relief may often be afforded by puncturing the membrana tympani, washing the ear out repeatedly with tepid water, and facilitating the discharge of matter from the tympanum, by causing the patient to lie on the affected side. If there is swelling or inflammation in the fauces, astringent gargles should be prescribed, or the steam of warm water should be inhaled. If there is reason to believe that the Eustachian tube is obstructed, the air-douche or the ear-catheter may be employed. For further information on this part of the treatment, consult surgical works on Diseases of the Ear.

2. CHRONIC INFLAMMATION OF THE INTERNAL EAR.

SYMPTOMS.—The principal symptom of chronic inflammation of the ear, whether external or internal, is a discharge of mucus, muco-purulent, or purulent matter (otorrhœa), from the external meatus. This may continue for months or years, accompanied by deafness, and either subsiding of itself, or yielding to the use of injections.

TERMINATIONS.—In caries of the temporal bone; in destruction of the parts within the tympanum; in cerebral disease; in permanent deafness.

TREATMENT.—The same as in chronic inflammation confined to the external ear, combined with the use of gargles, the air-douche, or the ear-catheter, with the precautions laid down in works on Diseases of the Ear. The purely medical treatment will be regulated by the existing state of the constitution. If it is connected with scrofula or syphilis, the remedies proper to those diseases; if combined with skin diseases affecting the head and face, the remedies required by the particular form of skin disease; if with a deranged state of the digestive organs, aperients and alteratives. Wholesome diet, cleanliness, pure air, proper exercise, and a strict attention to the state of the bowels, with tonics and alteratives, should be particularly insisted on in all forms of the disease.

CHAPTER VIII.

CUTANEOUS DISEASES.*

ORDERS.

1. EXANTHEMATA	Rashes.
2. VESICULÆ	Vesicles.
3. BULLÆ	Blebs.
4. PUSTULÆ	Pustules.
5. PAPULÆ	Pimples.
6. SQUAMÆ	Scales.
7. TUBERCULÆ	Tubercles.
8. MACULÆ	Spots.

DEFINITIONS.

1. *Exanthemata.* *Rashes.* — Superficial red patches, variously shaped, circumscribed, or diffused, disappearing on pressure, and terminating by resolution, deletescence, or desquamation.

This order comprises six genera—rubeola, scarlatina, erysipelas, erythema, urticaria, and roseola.

2. *Vesiculæ.* *Vesicles.*—Small, round, pointed elevations of the epidermis, or cuticle, containing lymph, which is either transparent and colourless, or opaque and pearly, and differing from bullæ by their smaller dimensions. These small blisters break and discharge their contents, and are succeeded by scurf, by a lamellated crust, or by superficial excoriations. Occasionally, their contents are absorbed.

The genera of this order are—miliaria, varicella, eczema, herpes, and scabies.

3. *Bullæ.* *Blebs.*—Vesicles of larger size, but having the same general characters and terminations.

The genera of this order are—pemphigus and rupia.

4. *Pustulæ.* *Pustules.*—Circumscribed elevations of the cuticle, containing pus, and terminating in thick crusts or scabs.

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* In treating this class of diseases, the arrangement adopted in Dr. Burgess's translation of Cazenave and Schedel's "Manual of Diseases of the Skin," has been followed; and the reader is referred to that work, and to Dr. Burgess's "Treatise on Eruptions of the Face, Head, and Hands," for more detailed information.

The varieties of pustules are—

a. Phlyzacium, or a pustule of considerable size, surrounded by a hard circular base of a bright-red colour, and succeeded by a thick dark scab, or incrustation.

b. Psydracium, or a small pustule, slightly elevated, surrounded by a pink efflorescence; its base often irregular, or but faintly marked, sometimes confluent, and terminating in a thin, laminated, circular incrustation.

c. Achor, or a small acuminated pustule, filled with straw-coloured gelatinous fluid, surrounded by an irregular efflorescence, but marked between it and its base by a faint interspace, usually confluent, terminating in a thin, light-brown, irregular crust.

d. Favus, or an irregular pustule of a large size, scarcely elevated, containing a more viscid straw-coloured fluid, surrounded by a rose-coloured base, terminating in a yellow, semi-transparent, or cellular crust, and sometimes by a superficial ulceration.
The genera of this order are—variola, vaccinia, ecthyma, impetigo, acne, mentagra, porrigo, and equinia.

5. *Papulæ. Pimples.*—Small, firm, pointed elevations of the skin, usually terminating in scurf, and very rarely by ulceration of the summit.
The genera of this order are—lichen and prurigo.

6. *Squamæ. Scales.*—Indurated, opaque, whitish or yellowish laminæ of the cuticle, covering papulæ or inflamed surfaces. They are continually being detached and renewed.
The genera of this order are—lepra, psoriasis, pityriasis, and icthyosis.

7. *Tuberculæ. Tubercles.*—Small, hard, solid, circumscribed tumours, larger than papulæ, with or without an inflamed base, permanent or persistent, imbedded in the skin, and terminating in resolution, partial suppuration, or destructive ulceration.
The genera of this order are—lepra tuberculosa, lupus, molluscum, and frambœsia.

8. *Maculæ. Spots.*—Permanent discolorations, or decolorations, of the skin, often accompanied by change of structure, but not affecting the general health.
Its genera are—discolorations—fuscedo cutis, ephelis, and nævus. Decolorations—albinismus and vitiligo.
Besides the foregoing, there are other diseases of the skin which admit of no exact classification; of which the principal are—lupus, pellagra, malum Alepporum, syphilida, purpura, elephantiasis Arabum, and cheloidea.

ORDER I.

EXANTHEMATA—RASHES.

RUBEOLA	Measles (p. 285).
SCARLATINA . . .	Scarlet-fever (p. 289).
ERYSIPELAS . . .	St. Antony's Fire (p. 241).
ERYTHEMA . . .	Inflammatory-blush.
URTICARIA . . .	Nettle-rash.
ROSEOLA	Rose-rash.

ERYTHEMA—INFLAMMATORY-BLUSH.

SYNONYMS.—Intertrigo; maculæ volaticæ; tooth-rash; gum.

SPECIES.—Erythema fugax; erythema læve; erythema papulatum; erythema tuberculatum; erythema centrifugum; erythema nodosum.

SYMPTOMS.—Redness of the surface, in patches of variable form and extent, disappearing on pressure, with little or no swelling, heat, pain, or fever. It is not contagious, nor in itself attended with danger.

TERMINATIONS.—In resolution without desquamation; or in resolution with slight desquamation (E. fugax and E. læve); or in a sero-purulent exudation of a disagreeable odour (E. intertrigo).

CAUSES.—Friction; heat and cold; acrid discharges, as those of coryza, leucorrhœa, or gonorrhœa, and the urine and fæces; irritation of internal parts, as in dentition; difficult menstruation, and dyspepsia; tension of the skin, as in anasarca.

DIAGNOSIS.—From *erysipelas*, by the redness being lighter and more superficial; by the less degree of swelling, and the absence of heat and pain; and by its milder character, and more favourable termination. From *roseola*, by the peculiar rosy tint of the latter. From *rubeola* and *scarlatina*, by the semi-lunar patches of the first, and by the great extent and deep-red hue of the last. Also by the peculiar constitutional symptoms and contagious character of these diseases.

PROGNOSIS.—Unattended with danger, and generally disappearing with the removal of the exciting cause. Sometimes chronic and permanent, especially when occurring on the legs of persons advanced in life.

TREATMENT.—When idiopathic, it soon disappears of itself, or yields to gentle aperients, spirit lotions, and the warm bath. If symptomatic, it does not long survive the removal of its cause, and its treatment is that of the primary disease.

Of the varieties of erythema, the following deserve attention:—

Erythema papulatum, which occurs in young persons of both sexes, on the trunk and upper extremities, in the form of small, round, and slightly-prominent patches, which disappear entirely in the course of a few days; *erythema tuberculatum*, in which the patches are larger, more prominent, and more permanent; *erythema nodosum*, which occurs, chiefly in children and young persons of both sexes, on the extremities, its most common situation being the forepart of the leg, its form rounded or oval, varying in size from a fourpenny-piece to that of a half-crown or five-shilling piece, at first slightly raised above the surface, and in a few days assuming the form of red painful tumours. The colour gradually changes from red to blue; the tumours soften, and disappear in from a week to a fortnight. This form of erythema is generally preceded by loss of appetite and slight constitutional symptoms. *Erythema centrifugum*, appearing in most cases on the cheek, in the form of small round patches, raised above the surface, which gradually spread from a small pimple till they cover a great part of the cheek. It is accompanied by heat and redness, and is apt to continue for several days. It is often connected with disorders of the menses.

These varieties of erythema do not demand any peculiar treatment. They either disappear of themselves, or they require gentle aperients, cold lotions, and tepid baths. In unusually severe cases, small doses of tartar-emetic may be combined with saline aperients, and Goulard's lotion; or an alkaline lotion containing a drachm of subcarbonate of potash to a pint of water, may be kept constantly applied.

URTICARIA—NETTLE-RASH.

SYNONYMS.—Essera; aspretudo; febris urticata; papulæ cuticulares.

SPECIES.—1. Urticaria evanida; 2. Urticaria febrilis.

1. URTICARIA EVANIDA.

SYMPTOMS.—An eruption resembling that produced by the stinging of nettles, whence its name. These little elevations often appear instantaneously, especially if the skin be rubbed or scratched, and seldom stay many hours, sometimes not many minutes, in the same place; but vanish, and again make their appearance in another part of the skin. The parts affected with the eruption are often considerably swelled. In some persons, the eruption lasts a few days only, in others many months or years, appearing and disappearing at intervals. Long weals are sometimes observed, as if the part had been struck with a whip. The little eminences always appear solid, not having any cavity or head containing either water or any other liquor. Intolerable itching is their invariable concomitant. They generally disappear in the day-time, and in the evening again break forth, accompanied with slight symptoms of fever. They terminate in a desquamation of the cuticle.

Causes.—Handling the leaves of the common nettle; use of shell-fish, lobsters, and muscles; mushrooms; honey; vinegar; cucumbers; salad; valerian, turpentine; copaiba.

Diagnosis.—The pathognomonic characters of this disease are its peculiar form and elevation, the itching which attends it, and its fugitive character.

Prognosis.—It may generally be expected to disappear under the use of simple remedies, but it occasionally lasts for months or years. It is quite unattended with danger.

Treatment.—If caused by irritating food, an emetic, followed by a gentle aperient, which may be combined, in severe cases, with tartar-emetic in small doses. The smarting may be allayed by lotions of acetate of lead, or of cyanide of potassium, or by the warm bath. In chronic cases, warm or vapour baths, alkaline or sulphur baths, together with a strictly-regulated diet, aperients, and alteratives. In very obstinate cases, Fowler's solution, in doses of five or six drops three times a-day, with some tonic infusion.

2. URTICARIA FEBRILIS.

Symptoms.—This is generally caused by some particular article of food which has disagreed with the patient. There is more or less fever or constitutional disturbance, followed by heat and tingling of the body; and then by an eruption, beginning on the shoulders, loins, and inner surface of the arms and thighs, and round the knees, consisting of irregularly-shaped pale blotches, surrounded by a deep-red border, but soon assuming a uniform deep-red colour, and accompanied by intense itching. The blotches appear and disappear several times in the course of the disease, and gradually subside in a few days or a week. There is generally an increase of itching and smarting towards evening. The *treatment* is that of the urticaria evanida, but more active. After an emetic of ipecacuanha, a saline aperient may be given three or four times a-day, with from ʒss. to ʒi. of antimonial wine. (Magnes. Sulph. ʒi., Magnes. Carb. gr. x, Vin. Ant. Pot. Tart. ʒss. Aq. Menthæ pip., Aquæ, āā ℥ss.)

ROSEOLA—ROSE-RASH.

SYNONYMS.—Rosalia; rosacia; rubeola spuria.

SPECIES.—Roseola infantilis; roseola æstiva; roseola autumnalis; roseola annulata.

SYMPTOMS.—Slight febrile symptoms, succeeded by patches of various size and form, of a deep-rose colour, appearing on different parts of the body, and generally disappearing in one or two days, or a week.

CAUSES.—Teething; irritation of the stomach and bowels; drinking cold water when the body is heated; severe exercise. The disease is sometimes epidemic, and it occasionally precedes the eruption of the small-pox, in which case it is apt to occasion some difficulty in the diagnosis.

DIAGNOSIS.—From measles and scarlet fever, by the mildness of the constitutional symptoms. The irregular semi-lunar patches of the former, and the greater extent of the latter, will serve to complete the diagnosis.

PROGNOSIS.—A favourable termination after a few days or a week. It is unattended with danger.

TREATMENT.—Saline aperients with small doses of tartar-emetic two or three times a-day; and an occasional warm bath.

The following species require attention:—*Roseola infantilis.* An eruption of numerous small distinct circular patches, of a deep rose-red colour, occurring in infants from dentition or intestinal irritation. —*Roseola æstiva.* This form is preceded by symptoms of fever, sometimes of considerable severity, accompanied by delirium and even by convulsions. It is most common in children and females. The eruption commonly appears between the third and seventh days on the face and neck, whence it rapidly spreads over the rest of the body. It is of a deep-red colour, attended with itching and pain. A redness of the throat, with some difficulty of swallowing, is an occasional concomitant of the rash. It lasts about three or four days, and then disappears. The *roseola autumnalis* is a less severe affection, occurring also chiefly in children, and presenting larger patches, seated chiefly on the upper extremities. *Roseola annulata*, appearing, as the name implies, in rosy rings, enclosing a portion of healthy skin, and gradually spreading. Their most common situations are the belly, loins, buttocks, and thighs. It may be acute or chronic, and is generally dependent upon some disorder in the primæ viæ.

ORDER II.

VESICULÆ—VESICLES.

Varicella	Chicken-pox (p. 284).
Eczema	Running Scall.
Herpes	Tetter.
Scabies	The Itch.
Miliaria.	Miliary-fever.

ECZEMA—RUNNING SCALL.

Synonyms.—Humid tetter; crusta lactea.

Species.—1. Acute; 2. Chronic.

1. ACUTE ECZEMA.

Varieties.—Eczema simplex; eczema rubrum; eczema impetiginodes.

Symptoms.—An eruption of small slightly-raised vesicles, closely crowded together on broad irregular patches of bright-red skin, accompanied by severe itching, tingling, and smarting. The fluid in the vesicles soon becomes opaque and turbid, and, in the course of four or five days, is discharged by the bursting of the vesicle, and dries into thin yellowish-green scabs. Fresh vesicles form in the surrounding skin, while the surface already affected is kept moist by constant exudation. When the eruption is of some standing, the skin presents a highly-inflamed surface, studded with a large number of minute pores, which are covered with thin white membranes. Its usual duration is from a week to a month.

Causes.—*Predisposing.* The female sex; the seasons of spring and autumn.

Exciting. Exposure to intense heat; irritation of the skin by a blister; frictions with mercury (*eczema mercuriale*); the handling of dry powders, flour, metals, &c. Contagion?

Diagnosis.—From *scabies*, by the vesicles of eczema being more clustered and less pointed; by the smarting of eczema contrasted with the itching of scabies. From *miliaria*, by the vesicles being smaller; by the absence of severe constitutional symptoms; and of the profuse perspiration. From *lichen agrius*, by the presence in the latter of distinct papulæ, and by the deeper colour of the skin. From *psoriasis*, by the presence of vesicles, and the thinner scales; and by the absence of fissures, except in the bendings of joints and the natural folds of the skin.

Prognosis.—*Favourable* in the acute form. The chronic disease is often very difficult of cure.

TREATMENT.—Aperients, cooling drinks, simple diet, warm baths, and the water-dressing. If attended with much inflammation or fever, general or local depletion, with a more strict antiphlogistic diet, and brisker aperients, combined with antimonials. Emollient applications, such as local baths of marsh-mallow or bran, or poultices of potato-flour. The distressing itching and smarting of the rash may be relieved by decoction of poppy-heads, or by a lotion consisting of two grains of the bicyanuret of mercury, or three grains of the cyanide of potassium to an ounce of distilled water. Preparations of sulphur, and greasy applications generally should be avoided. If the disease has been incurred by the employment of the patient, it may be necessary to oblige him to desist from following it.

The following varieties of acute eczema require special notice:—*Eczema simplex.*—A mild form of the disease, generally terminating in resolution; its most frequent situation the arm and forearm, and between the fingers. It is not preceded or attended by constitutional disturbance. It is of most frequent occurrence in women and young children. *Eczema rubrum.*—In this variety, the skin is inflamed, hot, and tense; of a bright red colour, and covered with small vesicles surrounded by an inflamed areola. The disease generally terminates in about a week, with slight exfoliation of the cuticle; but in more severe cases, the inflammation increases, the vesicles coalesce, the contained serum becomes opaque, and at length escapes as an irritating fluid, which forms loose thin incrustations, and these falling off, display a highly-inflamed surface. The disease either disappears in two or three weeks, the healing process beginning at the margins, or it becomes chronic. *Eczema impetiginodes.*—In this form, the inflammation is still more acute and rapid in its progress, and accompanied by much swelling and tension, the contents of the vesicles become purulent, and dry into soft yellow scabs. These scabs fall off, and are reproduced, displaying an inflamed surface covered with a reddish serosity. When very severe, it gives rise to febrile symptoms. It generally terminates in three weeks or a month, the skin gradually assuming a more healthy appearance, or it runs into the chronic form. This form of eczema is distinguished from impetigo chiefly by the vesicles being at first transparent, whereas impetigo is a pustular disease from the beginning. The scabs of impetigo are also thicker than the scabs of eczema.

2. CHRONIC ECZEMA.

SYMPTOMS.—This is a sequela of the acute form, and is often a very intractable disease. The skin, in consequence of the continued discharge of acrid serum and the reproduction of the vesicles, is highly inflamed and marked by fissures at the joints. There is an abundant secretion from the surface, which causes the clothes to adhere to the skin. In other instances, there is no exudation, but the surface is covered with shining crusts, and marked by fissures.

Beneath the crust the skin is of a bright-red colour. The disease often spreads from a small point over a considerable extent of surface, and is accompanied by intense itching, which is particularly distressing when the eruption occupies the inner surface of the thighs, the verge of the anus, or the vulva of females. When it attacks the face, the conjunction of the eye is involved, and there is much smarting, with some intolerance of light. The eruption often lasts for years, being heightened and renewed at spring and autumn.

CAUSES.—*Predisposing.* Obscure.—*Exciting.* Intestinal irritation; painful dentition; dysmenorrhœa.

TREATMENT.—That of the acute form, when the inflammation is severe. When the inflammation is less acute, alkalis administered internally and applied externally; the alkali may be combined with some of the bitter infusions. Plummer's pill, or small doses of tartar-emetic, with hyd. c. cretâ, may be given as an alterative three times a-day. The sulphureous baths, or a bath containing three ounces of sulphuret of potash may be used with advantage. Vapour baths, or the vapour douche, may also be recommended. To allay the itching, lotions of lead, decoction of dulcamara, or emulsion of bitter almonds may be used. The zinc ointment smeared over the surface, and renewed once or twice a-day, sometimes gives great relief. Simple cold-water dressing will often allay the irritation more effectually than any other application. In obstinate cases, one of two remedies—tincture of cantharides, or arsenic—the first in doses of three or four drops three times a-day, gradually increased and combined with some tonic infusion; the second in the form of Fowler's solution, in doses of five or six minims three times a-day, cautiously increased, and combined with infusion of quassia; or it may be given with ammonia or iron, according to the existing state of the system. External applications of a more stimulating kind, such as solutions of nitrate of silver (ten grains to the ounce), or of bichloride of mercury.

HERPES—TETTER.

SYNONYMS.—Dartre; olophlyctide.

SPECIES.—Herpes phlyctenodes; herpes labialis, and preputialis; herpes zoster; herpes circinatus; herpes iris.

SYMPTOMS.—Circumscribed groups of vesicles on an inflamed base, with intervals of sound skin between the vesicles, which are at first distinct, and contain a transparent fluid, but soon coalesce, the fluid becoming yellowish-white, or yellow. The contents of the vesicles escape and form a scab, that soon falls off, leaving an inflamed surface, which rapidly heals. The eruption is commonly preceded by slight constitutional symptoms, and sometimes by acute darting pain, which, when the eruption has made its appearance, changes to heat and smarting. The disease is rarely severe or attended with any danger, and generally lasts about a week or ten days.

Herpes phlyctenodes is the name given to those varieties of the disease which have no particular seat. *Herpes labialis* occupies, as its name implies, the lips, but may extend to the nose, cheeks, and chin; it also attacks the mucous membrane of the lips and mouth. It is a very common accompaniment of catarrh, and of inflammatory affections of the mucous membrane of the mouth, throat, and stomach. *Herpes preputialis* attacks the internal or external surface of the prepuce, and is preceded and accompanied by itching and smarting. It is necessary to distinguish it from syphilis, which is easily done in its recent stage, and afterwards by a careful attention to its history. The sore remaining after the vesicles have burst is superficial, and readily healed by separating the two surfaces of the prepuce by lint, and thus preventing friction. *Herpes zoster, zona, or the shingles.* This eruption is very characteristic in its appearance, its position, and its course. As the name implies, it surrounds the body like a zone or girdle, beginning somewhere about the mesian line, and travelling round one-half the body, below the nipple, at the lower part of the back and groin, or at the upper part of the thigh. It is often preceded for several days, or even longer, by very acute darting pains. It runs a mild course, and disappears in two or three weeks. *Herpes circinatus.* This form is arranged in rings, with a red border, and a centre of sound skin. *Herpes iris.* This is a very rare variety, appearing in round groups, and consisting of four rings of different shades of colour.

CAUSES.—*Predisposing.* The female sex; youth and middle age, but it occasionally occurs in old people.

Exciting. Catarrh; inflammation of the mucous membranes; certain disorders of the digestive organs.

DIAGNOSIS.—From *pemphigus*, by the size of the vesicles, and the arrangement in groups. The vesicles of pemphigus are much larger and isolated. From *eczema*, by the greater distinctness of the vesicles, and, as a general rule, by the smaller size of the patches. The situation of herpes labialis and preputialis, and the peculiar course and arrangement of herpes zoster, will further serve to distinguish those varieties. *Herpes circinatus* is distinguished from patches of *lepra*, from *porrigo scutulata*, and *lichen circumscriptus*, by its vesicular character.

PROGNOSIS.—*Favourable.* The disease lasts from a week or ten days to a month, and in rare cases longer.

TREATMENT.—Gentle aperients with antimonials, and a regulated diet, and local applications of warm mucilaginous liquids. The constitutional treatment must be regulated by the age and existing state of system. The vesicles may be punctured with advantage, and friction should be guarded against.

SCABIES—THE ITCH.

Synonym.—Psora.

Symptoms.—The usual seat of this eruption is between the fingers, on the wrists, inside of the forearm, and at the bends of the joints; but it may affect any part of the body except the face. It generally makes its appearance within a few days of the exposure to the contagion, and is preceded for one or two days by itching, increased towards evening and at night, and by all causes which excite the circulation. The eruption consists either of pale rose-coloured pimples, or of pointed vesicles, containing serum, and raised slightly above the surface. In severe cases these vesicles increase in size, and become filled with pus (scabies purulenta), or they are destroyed by friction, and leave small red spots. The disease is accompanied throughout by most distressing itching.

Causes.—*Predisposing.* Youth; the male sex; the sanguine temperament; the seasons of spring and summer; high temperature; neglect of personal cleanliness.

Exciting. Contagion; the *acarus scabiei.*

Diagnosis.—The vesicular and pustular forms of scabies are distinguished from *prurigo,* by the latter being a papular eruption, situated generally on the trunk or lower extremities, not contagious, and occurring generally in persons advanced in life. When scabies assumes the papular form, and the summits of the pimples are scratched off, so as to leave round blood-coloured spots, it is difficult to distinguish it from *pruritus senilis.* In such cases advanced age affords a probability in favour of the latter; while the fact of more than one member of the same family being affected, is conclusive as to the former. From *lichen,* by the latter being papular, more clustered, and if situated on the hand, being at the back of the hand, and not between the fingers. From *eczema,* by the vesicles of eczema being more clustered, and flatter, by the absence of contagion, by the peculiar smarting pain, and often by the situation. The fact that scabies does not attack the face, distinguishes it from all skin diseases having that seat.

Prognosis.—*Favourable,* but sometimes obstinate. Its more usual duration is a week or ten days, but it may continue for months.

Treatment.—Sulphur ointment, or an ointment of sulphur and subcarbonate of potash; sulphur baths; sulphuret of lime, with olive oil; a lotion consisting of super-sulphate of potash (sulphate of potash ℥ iv., sulphuric acid ℥ss., water O iss); hellebore ointment; an ointment of hydriodate of potash; a strong alcoholic solution of stavesacre. Cleanliness and the warm bath, gentle aperients if required, and in very rare cases bleeding, are useful auxiliaries.

Prophylaxis.—Personal cleanliness is a sure preventive of this disease.

MILIARIA—MILIARY FEVER.

Symptoms.—Oppression, and sense of tightness about the præcordia; the breathing laborious, and interrupted by frequent sighs, or a teasing cough; rigors, extreme debility, and depression of spirits, followed by increased heat of surface, with wandering pains and restlessness. After these symptoms have continued for a variable period of from two to five or six days, a *profuse sweat*, of a sour, rank odour, makes its appearance, accompanied by a harassing pricking or itching of the skin. On an *uncertain day*, a number of small red papulæ, about the size of millet-seeds, are observed first upon the neck and breast, and thence gradually extending to the trunk and extremities; their prominence is imperceptible to the sight, yet evident to the touch; they often lose their redness, and appear of the ordinary colour of the skin. After *ten or twelve hours*, a small vesicle appears upon the top of each: this at first is of a whey colour, but afterwards becomes white. At other times the vesicles retain their red colour, which has given rise to the division into the red and white eruptions; they generally appear separately; sometimes, however, they are intermixed; in both, the matter contained in the vesicles has a peculiarly offensive smell. In *two or three days* the vesicles break, and are succeeded by small crusts, which fall off in scales; or the disease terminates in resolution, or by desquamation. The febrile symptoms do not subside on the appearance of the eruption, but after a variable interval.

Causes.—*Predisposing.* Lax habit of body; sanguine temperament; childhood; the female sex; the period of childbirth; old age; preceding attacks of the same disease; debility, however induced; excessive evacuations; long-continued and copious menstruation; fluor albus; the presence of irritating matter in the primæ viæ; abuse of tea-drinking?

Exciting. Immoderate sweating, produced by excessive heat, or by heating medicines. Too much bed-clothes and warmth in the puerperal state.

Diagnosis.—The uncommon anxiety and dejection of mind; the profuse sweating, and the peculiarly fetid, rank odour of the perspiration. Afterwards, the appearance of the eruption.

Prognosis.—*Favourable.* The fever assuming a mild form; remission of the symptoms upon the appearance of the eruption; the papulæ of a florid red colour.—*Unfavourable.* The sweating obstinately continuing after the eruption of the papulæ, with increase of fever; great anxiety; flaccidity of the parts covered by the eruption; profound coma; difficulty of breathing; dejection of mind; the sudden disappearance of the eruption, followed by great prostration of strength, anxiety, difficult respiration, violent vomiting, delirium, convulsions; the appearance of petechiæ interspersed among the papulæ; rapid, weak, and intermitting pulse; anasarcous swellings.

TREATMENT.—*Indications.* I. To diminish the immoderate heat and sweating. II. To support the strength of the patient, where there are concomitant symptoms of great debility.

I. The first indication will be accomplished,

(*a*) By the cautious application of *cold*;—the air of the bed-room should be cool, part of the bed-clothes should be removed; and the patient should be desired to lie with the arms exposed.

(*b*) By gentle *aperients*, of which the milder mercurial preparations and the neutral salts are to be preferred.

(*c*) By mineral *acids*; especially the dilute sulphuric acid, which may be given in the infusion of roses, or with decoction of bark or quinine.

II. The second indication requires,

Ammonia, or bark and wine; and where there is great restlessness, opium.

Should a retrocession of the eruption take place, followed by the alarming symptoms above mentioned, musk, camphor, opium, blisters, and frictions to the skin; endeavouring by every means to bring out and support a copious diaphoresis; external warmth; powerful diaphoretics, &c. The skin may be washed with a solution of chloride of lime.

ORDER III.

BULLÆ—BLEBS.

PEMPHIGUS . .	Vesicular Fever.
RUPIA . . .	Atonic Ulcer.

PEMPHIGUS—VESICULAR FEVER.

SYNONYMS.—Bullæ; phlyctena; pompholix; hydatis; febris bullosa; febris vesicularis.

SPECIES.—Pemphigus infantilis; pompholix solitarius; pompholix diutinus.

SYMPTOMS.—The rash is ushered in by the usual symptoms of the cold stage of fever; lassitude, headache, sickness, oppression, frequent pulse, in some instances delirium. On an *uncertain day* an eruption takes place of red circular patches, which soon terminate in pellucid blisters, similar to those produced by a burn, varying in size, sometimes as large as walnuts, more frequently about the size of almonds; surrounded by an inflamed margin or areola, and distended with a faintly yellow serum. They appear on the face, neck, trunk, arms, mouth, and fauces.

After the blisters have remained from one to several days, they either break and discharge a yellowish, bland, or sharp ichorous fluid, or they begin to shrink, and in a short time disappear.

Pemphigus infantilis is apt to appear in young infants in lying-in hospitals. It presents the usual character of pemphigus, but has been mistaken for syphilis. *Pompholix solitarius,* characterized by the appearance of a single bleb at a time, on successive days, or at short intervals, and assuming either an acute or chronic form. *Pompholix diutinus,* an essentially chronic disease, occurring, for the most part, in middle-aged and old men, lasting for a considerable time, and sometimes extending over the entire surface of the body.

CAUSES.—*Predisposing.* The male sex; adult and old age; summer season.

Exciting. Unwholesome and scanty food, bad ventilation, and all the causes of cachexia. Specific infection?

DIAGNOSIS.—From *vesicular eruptions,* by the larger size and less clustered form of the vesicles. From *rupia,* by the absence of thick scabs. From *ecthyma,* by the contents of the vesicle being transparent. From *erysipelas,* by the irregular vesicles of the latter appearing on a highly-inflamed surface, which is constantly spreading.

PROGNOSIS.—Generally *favourable.* But the disease may be of long continuance.

TREATMENT.—That proper for the concomitant fever, and varying with its type. In common cases, gentle aperients, antimonials and acid drinks. As the disease generally occurs in cachectic or debilitated constitutions, tonics or stimulants, and generous diet will be required.

The local treatment will consist in puncturing the vesicles as they appear; and if there is much pain, emollient applications must be applied to the skin. Disorders of the alimentary canal, which frequently accompany the disease, must be treated by the remedies appropriate to the particular disorder.

RUPIA—ATONIC ULCER.

Synonym.—Ulcus atonicum.

Species.—Rupia simplex; rupia prominens; rupia escharotica.

Symptoms.—This disease commonly attacks cachectic persons, and those whose constitutions have been impaired by privation and unwholesome influences, or by previous disease. It consists in the appearance of round, flattened, and isolated blebs, about the size of a shilling, filled with a serous fluid, which changes after a time to pus. These blebs shrink, and become covered with thick brownish crusts, beneath which the skin is slightly ulcerated. When the scabs fall off, the ulcers either heal or continue open for a while. The disease is chronic, and continues from a few weeks to several months. Its most common seat is the lower extremities.

Rupia simplex is the mildest form of the disease, and answers to the above description.

Rupia prominens.—This differs from the foregoing, chiefly in the larger size of the blebs, the greater thickness of the scabs, and the greater extent of the inflammation and subsequent ulceration. The scabs are formed by several layers of hardened secretion, and assume a conical shape, and an appearance not unlike that of an oyster-shell in miniature.

Rupia escharotica affects infants in the interval from birth to the first dentition, is accompanied by much constitutional disturbance, and sometimes terminates fatally. The ulcers left after the separation of the scabs are longer healing, apt to spread, and secrete a fetid sanies.

Causes.—All those circumstances which tend to produce a cachectic state of the system.

Diagnosis.—From *pemphigus*, by the thick laminated scab, the inflammatory areola, and subsequent ulceration. From *ecthyma*, by the blebs at first containing serum, by the peculiar scab, and the subsequent deep ulcerations. In very severe cases, the secretion being from the first purulent, it may not be possible to distinguish rupia from ecthyma.

Prognosis.—*Favourable*, except in the more severe cases of rupia escharotica.

Treatment.—*Local.* Warm baths; alkaline baths; emollient applications, and if the ulcerations are obstinate, the application of nitrate of silver, dilute mineral acids, or stimulating ointments.—*General.* Tonics or stimulants, with alteratives, according to the state of the patient; and strict attention to diet, ventilation, and cleanliness:—the treatment, in a word, of cachexia.

ORDER IV.

PUSTULÆ—PUSTULES.

Variola	Small-pox (p. 275).
Vaccina	Cow-pox (p. 281).
Ecthyma	Ecthyma.
Impetigo	Running Tetter.
Acne	Copper Nose.
Sycosis	Chin Welk.
Porrigo	Scald Head.
Equinia	Glanders.

ECTHYMA.

Synonyms.—Farunculi atonici; phlyzacia agria; scabies fera.

Symptoms.—The eruption begins in the form of distinct inflamed circumscribed spots, which increase till they attain a considerable size. Pustules form on the centre, and sometimes increase in size till they bear a close resemblance to the larger bullæ of rupia. In two or three days the pustules dry up, leaving behind them thick scabs, and these falling off, leave a purple discoloration of the skin, or in severe cases, and in greatly-impaired constitutions, an unhealthy ulcer. The eruption is sometimes accompanied by pain, and by slight febrile symptoms.

Cause.—*Predisposing.* Childhood and old age.—*Exciting.* All the causes of cachexia.

Diagnosis.—From *acne, impetigo, sycosis, and porrigo,* by the larger size of the pustules, and their inflamed and indurated base. From *variola,* by their size and the absence of the central depression, and of contagion: From *vaccina,* by the cellular structure of the latter, and its contagious nature. From *syphilitic eruptions,* by the history of the case, the accompanying symptoms, and the copper-colour of the eruption. From *farunculi,* by the common boil being an abscess of the cellular membrane, and not a pustule on an inflamed base. From *scabies,* by the large size of the pustules compared with their small size in scabies purulenta.

Prognosis.—The disease is not attended with danger; but sometimes resists treatment for a considerable period.

Treatment.—Emollient applications to the part, and if the ulcers assume a chronic form, nitrate of silver, or the dilute nitric or muriatic acid, or stimulating ointments. Gentle aperients and alteratives, wholesome food, pure air, exercise, cleanliness, and the use of the sea-water bath, or of alkaline baths, as gentle stimulants to the skin.

IMPETIGO—CRUSTED TETTER.

Synonyms.—Running tetter; scale; cowrap.

Species.—Impetigo figurata; impetigo sparsa; impetigo larvalis; impetigo granulata.

Symptoms.—The eruption appears in the form of clusters of small pustules, slightly raised above the skin, which burst in from one to three days, and discharge a purulent fluid, that hardens into the form of thick, yellow, semi-transparent incrustations. These scabs rest on an inflamed base of an irregular shape, moistened by the sero-purulent fluid. The eruption sometimes disappears in a few weeks, but in other instances continues for months or years, the existing patches being succeeded by fresh groups of pustules. The disease is accompanied by some constitutional disturbance, and by intense heat and itching.

Impetigo figurata generally occurs in defined patches, on the face, and most commonly on the cheeks, but may attack any part of the body. It is most common in spring, and in young children, especially during dentition. *Impetigo sparsa* is more irregular in its distribution, and is most frequently seen on the extremities, and around the joints. Its most common period is the autumn; and it may assume either an acute or chronic form. *Impetigo larvalis* is common in infants, and its usual seat is the scalp, ears, and lips. It may also occur on the cheek, which it covers with a thick yellowish-white crust, resembling a mask, whence its name. In one of its forms it has received the name of *crusta lactea*. *Impetigo granulata*. This form of the disease appears as a number of whitish-yellow pustules, each traversed by a single hair, accompanied by severe inflammation and itching, bursting in from two to four days, and pouring out an exudation of sero-purulent matter, which hardens into a hard, rough, brownish crust. The scabs have a nauseous odour, and are sometimes found filled with lice. The disease is most common in uncleanly persons.

Causes.—*Predisposing*. The seasons of spring and autumn; infancy and childhood; the lymphatic temperament.—*Exciting*. The application of irritating substances to the skin; unwholesome diet; impure air; want of cleanliness; violent exercise; strong mental emotions. The disease is not contagious.

Diagnosis.—The pathognomonic character is the formation of clusters of small pustules (psydracia), succeeded by scabs of varying tints, from whitish-yellow to dark brown. From *eczema*, by the primary form of impetigo being pustular, and by the thick scab of the latter, contrasted with the thin scaly crust of the former. When it attacks the chin, from *sycosis*, by the larger size of the pustules of the latter, and by the less copious exudation. From *porrigo*, by the latter being contagious, and destroying the hair, and by the peculiar character of the scab. (See Porrigo.)

PROGNOSIS.—*Favourable*, in the young and in its acute forms. Obstinate and difficult of cure in the old and in chronic forms. It is unattended with danger.

TREATMENT.—In cases of unusual severity, general bloodletting, or the application of leeches near the seat of the disease, with antiphlogistic remedies, may be required. In less severe forms of the disorder, emollient applications, tepid baths, the vapour douche, and gentle aperients. The troublesome itching which attends this disease may be relieved by a prussic-acid lotion, containing half an ounce of dilute prussic acid, and the same quantity of alcohol, in an eight ounce lotion. In chronic impetigo, in addition to tepid baths, alkaline lotions to the skin; the sulphur bath; the dilute acids, or a weak solution of nitrate of silver. Stimulating ointments may also be usefully applied. In obstinate cases, Fowler's solution.

ACNE—COPPER NOSE.

SYNONYMS.—Varus; gutta rosea.

SPECIES.—Acne simplex; acne indurata; acne rosacea; acne punctata; acne sebacea.

SYMPTOMS.—This disease attacks the sebaceous follicles of the skin, and appears in the form of isolated pustules, seated on a hard, red base, and terminating in indolent chronic tumours. Its primary form is, in most cases, a hard, red pimple. It is most commonly seen on the nose, cheeks, temples, and forehead, but frequently makes its appearance on the back and upper part of the chest, and sometimes on the neck and shoulders. The three varieties are often to be seen at the same time on the same person. It is essentially chronic, and not accompanied by constitutional symptoms; is most frequent from puberty to the age of thirty-five, and occurs in both sexes.

Acne simplex answers to the foregoing description, its most common situation being the shoulders and upper part of the chest. But it also occurs on the face. *Acne indurata* is characterized by the formation of large indurated tumours by the union of several of the smaller follicles. Its most common seat is the face, but it often occupies the back of the trunk. *Acne rosacea* is most frequently met with in old persons, especially females, and its common seat is the nose and cheeks. As the name implies, the disease is attended with a rosy colour of the skin, which, however, is not permanent, but changes at length to a violet tint. In extreme cases, the superficial veins enlarge, and the cellular tissue, to some depth, becomes inflamed and hardened (acne indurata). *Acne punctata* derives its name from a small black point, which forms on the summit of each pimple. *Acne sebacea* is named from the smooth waxy appearance which the eruption sometimes assumes.

DIAGNOSIS.—This is rendered easy, by bearing in mind the small-sized pustule situated on the hardened base; and the diagnosis will often be assisted by the situation of the disease.

PROGNOSIS.—In *acne simplex*, favourable. It often disappears of itself with the advance of age. *Acne indurata* is often very obstinate, and defies all modes of treatment; and the same is true, in a still greater degree, of *acne rosacea.*

CAUSES.—Hereditary predisposition; dyspepsia; excess of eating and drinking; uterine disorders; change of life; the application of irritating substances to the skin of the face.

TREATMENT.—In young and vigorous subjects when the disease is recent, a restricted diet, and the avoidance of all stimulating liquors; gentle aperients, and, in extreme cases, general bloodletting, with spirit lotions, or lotions of the acetate of lead. In chronic cases, and in *acne indurata*, the same general treatment, varied according to the constitution and state of the patient. The local treatment will consist of frictions, with an ointment of iodide of sulphur, in the proportion of a scruple of the iodide to an ounce of lard, or a paste made of sulphur and milk. Dilute acids or the nitrate of silver cautiously applied to the eruption, or a lotion consisting of two grains of the bicyanuret of mercury to an ounce of distilled water, are also beneficial. This lotion should be applied with a camel's-hair pencil, and after a short interval, washed off with cold water. A course of alterative medicines may be given at the same time. A drop of creosote in a mucilaginous draught may also be given with advantage two or three times a-day. *Acne rosacea* requires a very careful regulation of the diet, proper exercise, abstinence from stimulating liquors, avoidance of heated apartments, hot fires, and mental excitement, together with the local application of the vapour douche, or the lotion of bicyanuret of mercury. In very obstinate cases of acne, blisters have sometimes been applied with advantage.

SYCOSIS—CHIN WELK.

SYNONYM.—Mentagra.

SYMPTOMS.—Redness, heat, and a sense of tension of the skin of the chin, lower jaw, or upper lip, followed by an eruption of small red points, which, in the course of a day or two ripen into distinct pointed pustules, traversed by a single hair. After five or six days more, the pustules burst, discharge their contents, and form thin brownish scabs, which fall off, and are sometimes not renewed, the disease terminating in from ten days to a fortnight. The eruption is attended with a smarting pain. When the disease has continued for some time, the beard falls off. In chronic cases the skin of the parts affected is covered with a tubercle.

CAUSES.—*Predisposing.* The male sex; youth; the seasons of spring and autumn.

Exciting. Irritants; heat; neglect of cleanliness. Contagion? A peculiar species of cryptogame.

DIAGNOSIS.—The situation of the eruption distinguishes it from many diseases. The small pointed pustules, on a hard base, serves to distinguish sycosis from other diseases attacking the same part.

PROGNOSIS.—*Favourable*, but guarded. It is often very obstinate.

TREATMENT.—Emollient fomentations, cooling drinks, and laxatives, when the disease is acute. In extreme cases, more severe antiphlogistic remedies may be necessary. The hair should be cut with scissors. In chronic cases, and when the tubercles are large, frictions, with stimulating ointments, or the local application of the dilute acids, or a dilute solution of lunar caustic, or the lunar caustic in substance. The vapour bath or douche, or the sulphur bath, may also be used with advantage; ointments of sulphur, iodide of sulphur, and protiodide of mercury, have also been recommended. Mercury as an alterative, and preparations of iron, have been found useful.

PORRIGO—SCALD HEAD.

SYNONYM.—Tinea.

SPECIES.—Porrigo favosa; porrigo scutulata; porrigo decalvans.

SYMPTOMS.—Small, contagious pustules, seated on the hairy scalp, occurring generally in childhood, but not confined to young persons. The pustules are small and round, contain a yellow matter, which concretes so as to form a hard, prominent scab, presenting a central depression. There are no febrile symptoms. The seat of the disease is the hair follicles. A roughness of the skin with a brown scale generally precedes the distinct appearance of the pustules.

Porrigo favosa, favus; porrigo lupinosa; honey-comb scale. This form is not confined to the scalp, but may attack the chin, eyebrows, or forehead, and, in rare instances, the trunk or extremities. Its chief characteristic, when fully formed, is the peculiar thick yellow scab, marked by numerous depressions, and bearing some resemblance to a honey-comb. The *porrigo scutulata*, or ringworm, like the foregoing, occurs chiefly on the scalp, but is sometimes seen on the forehead and neck, and still more rarely, as the result of direct contact, on other parts of the body. It is arranged in the form of rings, enclosing a centre which is less thickly covered with pustules. The hair ultimately falls off from the part affected, leaving a shining bald patch. When the disease is of some duration, it may be seen at the same time in all its stages—the red patches, the cluster of yellow pustules, crusts of various thickness, and bald spots. When the disease has disappeared, the hair is slowly reproduced, and sometimes is never replaced. The *porrigo decalvans* consists of circular patches of baldness, without any distinct eruption on the surface, and surrounded by hair of a perfectly natural appearance. Though bearing the name of porrigo, it ought, perhaps, to occupy a place by itself.

CAUSES.—*Predisposing.* Scrofula; age from seven to fourteen. *Exciting.* Contagion; a peculiar species of cryptogame?

DIAGNOSIS.—The contagious character of the eruption, the clustered pustules, the rough pitted scab, and the subsequent baldness, will serve to distinguish this disease from others. The form of the eruption distinguishes porrigo scutulata from porrigo favosa, and from most other cutaneous diseases.

PROGNOSIS.—The disease is often obstinate, and of long duration.

TREATMENT.—The hair must be first cut close with sharp scissors, the head must be well washed, and the scabs must be softened with warm fomentations or poultices. The best local application, in the great majority of cases, is the iodide of sulphur ointment; when this does not prove successful, a strong solution of nitrate of silver, or the dilute mineral acids, or creosote, may be used. Several other forms of stimulating washes and ointments have also been recommended. The mixed vapour of iodine and sulphur applied to the patch through a flexible tube is strongly recommended by Dr. Burgess. The powder used to generate the vapour consists of from four to eight grains of iodine to an ounce of sulphur; the vapour to be applied three times a-day. The general treatment consists in the use of tonics, especially the preparations of iron, with aperients as often as necessary. *Porrigo decalvans* is best treated by repeated applications of a strong solution of nitrate of silver.

EQUINIA—GLANDERS—FARCY.

SYMPTOMS.—The disease generally sets in with pain in the head, back, and limbs, nausea, thirst, great prostration of strength, and stiffness and pain in the joints, increased by motion. These symptoms are followed, after a short but variable interval, by redness, heat, swelling, and excoriation of the nose, lips, and cheeks; the eyes are inflamed, and the eyelids swollen; there is a profuse discharge of a yellow or sanious fluid from the nostrils; and pustules appear on different parts of the body. These local symptoms are accompanied by a hot skin, urgent thirst, frequent, weak, and irregular pulse, and feeble respiration. The tongue is covered with a dark fur; the skin is bathed in a profuse and offensive perspiration; the evacuations are slimy and fetid. These symptoms increase in severity, and are followed, after a few days, by diffused abscesses in different parts of the body, especially about the joints; typhoid symptoms rapidly supervene; the nose and lips become gangrenous; the discharges extremely offensive; low muttering delirium sets in, and death takes place by collapse.

In farcy, the pustules are accompanied by small red tumours on different parts of the body, which rapidly change to a dark brown colour, become extremely painful, and exude, from small cracks on their surface, a thin acrid sanies. If the disease is the result of inoculation, a pustule forms on the site of the injury, and is succeeded by an unhealthy ulcer, and by inflammation of the absorbent glands. This modification runs a more chronic course than glanders.

Anatomical Characters.—Besides the pustules and tumours on the surface, congestion of the mucous membrane of the nose, fauces, air-passages, and alimentary canal; congestion of the lungs; phlebitis; purulent deposits in the lungs and joints; diffused abscess in the cellular membrane; and sero-sanguinolent fluids in the serous cavities.

Causes.—Contagion and infection. The disease originates in quadrupeds, and is most commonly communicated from the horse to the human subject.

Diagnosis.—This presents no difficulty. The seat and character of the pustules, and the history of the case, prevent it from being confounded with any other disease.

Prognosis.—Highly unfavourable. The disease is generally and speedily fatal.

Treatment.—No remedy has yet been discovered. The treatment must be that of typhus fever.

Prophylaxis.—Those who are employed in grooming horses affected by glanders should wear gloves, avoid contact with the diseased animal, and practise scrupulous cleanliness.

PAPULÆ—PIMPLES.

LICHEN.
PRURIGO.

LICHEN.

SYNONYMS.—Papulæ siccæ; scabies sicca vel agria.

SPECIES.—Lichen simplex; lichen strophulus; lichen urticatus; lichen agrius.

SYMPTOMS.—This disease consists in an eruption of small, hard pimples, sometimes of the colour of the skin, sometimes red, generally arranged in patches or clusters, and accompanied by severe itching. Its most common situations are the hands, forearms, neck, and face, but it may attack other parts of the body. It is generally a chronic disorder, but sometimes assumes an acute form. Its usual termination is in desquamation.

Lichen simplex answers to the foregoing description. *Lichen strophulus*, commonly known as *red gum*, *white gum*, or *tooth-rash*, attacks children at the breast, or during the process of dentition, is an acute affection, and generally continues for three or four weeks. It has received many names, according to the arrangement of the pimples and the colour of the skin. *Lichen urticatus* is characterized by the large size of the papulæ, and their close resemblance to the sting of nettles. In *lichen agrius*, the papulæ are confluent, and seated on a highly-inflamed base; the pimples ulcerate and discharge a sero-purulent fluid, which dies into small scabs, and these falling off, are replaced by thin scales. It is accompanied by intense smarting pain.

CAUSES.—*Predisposing*. The seasons of spring and summer.

Exciting. Extreme heat; irritants applied to the skin; the handling of dry powders; abuse of ardent spirits; grief; disorders of the stomach and bowels; and in children, the irritation of teething.

DIAGNOSIS.—The papular form of the eruption, the severe itching, and its non-contagious character, serve to distinguish this disease from most others. It is distinguished from prurigo, by the pimples in the latter disease being larger and flatter, and generally torn and covered with a minute clot of blood.

PROGNOSIS.—Lichen is not dangerous, but troublesome, and sometimes difficult of cure.

TREATMENT.—In its acute forms, and especially in severe cases of lichen agrius, general bloodletting is sometimes required, with low diet, brisk aperients, and the antiphlogistic regimen, and tepid and emollient applications to the skin. Chronic cases require stimulating applications; such as a wash of subcarbonate of potass, ointments of iodide and biniodide of mercury (ʒ i. to ℥ i. of lard), and sulphur and iodine vapour. In very obstinate cases, Fowler's solution may be necessary.

PRURIGO—PRURITUS.

Species.—Prurigo mitis; prurigo formicans; pruritus senilis.

Symptoms.—A chronic disease, in which the papulæ are of the colour of the skin, larger than those of lichen, and accompanied by intolerable itching. It may occur on any part of the body, but is most frequently met with on the neck and shoulders. In some instances it is confined to one spot, such as the external parts of generation in both sexes, the verge of the rectum, &c. In consequence of the friction, the papulæ are apt to be torn, and to present on their summit a minute clot of blood, which gives to the eruption a very characteristic appearance.

Prurigo mitis presents a smaller-sized pimple than the *prurigo formicans*, and is attended with less itching. In the latter disease, the itching is greatly increased by the warmth of bed. *Pruritus senilis* is accompanied by greater dryness of the skin, and in some cases by large numbers of minute insects; whence the term *pedicularis.*

Causes.—*Predisposing.* Childhood and old age, and the seasons of spring and summer.

Exciting. All causes of debility, and cachexia; want of cleanliness; unwholesome food, privation, grief, friction, irritation of the skin or of the mucous membranes.

Diagnosis.—From *lichen* by the larger size of the pimples, by the dark spot on their surface, and by the more severe itching.

Prognosis.—Not dangerous; but very difficult of cure, especially in aged persons.

Treatment.—In cases of prurigo mitis and formicans, tepid baths, gentle aperients, with antimonials; and in very severe cases, an antiphlogistic regimen. In pruritus senilis, the sulphur bath, or the mixed vapours of iodine and sulphur, is the best remedy. There is no hope of cure but in stimulating applications, of which this is the best. For the destruction of lice, a wash of bichloride of mercury, or the unguentum veratri, will be necessary.

ORDER VI.

SQUAMÆ—SCALES.

LEPRA VULGARIS	Scaly Leprosy.
PSORIASIS	Dry Tetter.
PITYRIASIS	Dandriff.
ICTHYOSIS	Fish-skin.
PELLAGRA	Italian Leprosy.

LEPRA VULGARIS—SCALY LEPROSY.

SPECIES.—Lepra alphoides; lepra nigricans.

SYMPTOMS.—The eruption begins in the form of small round shining spots, slightly raised above the skin, and becoming soon covered with a thin scale, which, falling off, leaves the surface of the skin red and slightly crusted. The spot increases in size, still retaining its circular form, and is covered by a thicker scale, raised at the circumference, and depressed towards the centre. These patches, when fully formed, vary in size, from that of a shilling to that of a five-shilling piece. Their most common situation is the neighbourhood of the large joints, especially the knees and elbows, but they may appear on any part of the body, with the exception generally of the face and hands. The spots are often arranged symmetrically on the upper and lower extremities. In cases of long standing, several of the original spots coalesce, and form large scaly patches of a very irregular shape. The disease is essentially chronic, but disappears and returns without obvious cause.

Lepra alphoides is characterised by the small size of the patches, and the silvery appearance of the scales which covers them. *Lepra nigricans* is a rare disease, distinguished chiefly by its darker colour.

CAUSES.—*Predisposing.* The season of autumn; male sex; adult age.

Exciting. Irritation of the skin; strong mental emotions; salt meat.

DIAGNOSIS.—From *syphilitic lepra*, by the copper or violet-colour of the skin in the latter, and the thin, shining, and imperfect scales. From *porrigo*, by the situation, which in the case of lepra, is rarely on the scalp, and by the distinct scaly character as distinguished from the small pustules of porrigo. From *psoriasis*, by the more irregular shape of the patches in the latter, and by the centre being raised instead of the circumference, as in lepra.

PROGNOSIS.—It is unattended with danger, but obstinate and difficult of cure.

TREATMENT.—In young and vigorous persons, and in recent cases, the antiphlogistic treatment and regimen, with tepid baths. In chronic cases, and in old persons, a course of tonics, frictions with the iodide of sulphur ointment, and sulphur and salt-water-baths; and if the disease resist this treatment, preparations of arsenic, or tincture of cantharides internally. The iodide of arsenic, (the tenth of a grain three times a-day,) and the vapour of sulphur and iodine, are strongly recommended by Dr. Burgess. The vapour to be applied, by means of a tin box or jar, to the part affected.

PSORIASIS—DRY TETTER.

SPECIES.—Psoriasis guttata; psoriasis diffusa; psoriasis inveterata; psoriasis gyrata.

SYMPTOMS.—A chronic affection of the skin, consisting of irregular patches of various size, slightly raised above the surface, and covered with a white scale. They are attended with some degree of itching, especially at night, but by no marked constitutional disturbance.

Psoriasis guttata appears in small, distinct, round, red patches, generally in the adult, and is often combined with the other forms.

Psoriasis diffusa is more irregular both in shape and size. The patches are often of considerable extent, and commonly situated on the limbs, and in severe cases they are marked by large fissures.

Psoriasis inveterata is a very severe form of the disease, and generally occurs in old persons, and in debilitated habits. The skin, in the progress of the disease, becomes hard, thickened, and covered with a shining scale, which, when removed, leaves a red, fissured, painful, and bleeding surface. *Psoriasis gyrata* occurs in spiral-shaped stripes, generally on the back. It is of very rare occurrence. Psoriasis occurs on the eyelids, lips, prepuce, scrotum, backs and palms of the hands, and nails, and has received names from these several situations. Psoriasis palmaris (grocers' and bakers' itch) and Psoriasis dorsalis (common in washerwomen) are its most frequent varieties.

CAUSES.—*Predisposing.* Hereditary predisposition; adult age; spring and autumn; scrofula.

Exciting. Abuse of spirituous liquors; unwholesome food; handling of dry powders. It is not contagious.

DIAGNOSIS.—From *lepra* (see Lepra). From *syphilitic lepra,* by the peculiar colour of the latter; from *eczema,* by the absence of vesicles, and the larger size and greater thickness of the scabs; from *lichen,* by the absence of papulæ in the early stage.

PROGNOSIS.—A very obstinate and intractable disease, especially in old persons and debilitated constitutions.

Treatment.—After a short course of mild aperients, and strict regulation of diet, with emollient fomentations, alterative medicines, such as a Plummer's pill, or a pill containing the fifth of a grain of the biniodide of mercury, with the external application of the iodide of sulphur ointment, or of the mixed vapour of iodine and sulphur. In bad cases of psoriasis inveterata, preparations of arsenic, iodine, mercury, or phosphorus. Donovan's solution of arsenic, iodine, and mercury (see Formulæ), is a valuable combination of the first three substances. (In a very severe form of psoriasis inveterata, occurring in a middle-aged female in delicate health, the disease was speedily cured by arsenite of iron, in the dose of a twelfth of a grain three times a-day, cautiously and slowly increased to a sixth of a grain. The itching and smarting were also greatly relieved by a lotion consisting of ten grains of cyanide of potassium in six ounces of almond emulsion. G.)

PITYRIASIS—DANDRIFF.

Species.—Pityriasis capitis; pityriasis rubra; pityriasis versicolor; pityriasis nigra.

Symptoms.—The disease consists of superficial chronic inflammation of the skin, accompanied by abundant desquamation, which is constantly renewed. Its most common seat is the scalp, but it attacks other parts of the body. There is itching of the skin, slight in some cases, severe in others. The disease is chronic, and not accompanied by any constitutional disturbance.

Pityriasis capitis occurs at all ages, and often in new-born infants. It is a very slight affection, but frequently of long duration. It is accompanied by slight itching, and friction detaches numerous white branny scales. *Pityriasis rubra* is distinguished from the foregoing by the red colour of the skin. The coloured portions are small spots which coalesce and extend gradually over large portions of the surface. In *pityriasis versicolor*, the colour of the skin is yellow in place of red, and the skin is covered, as in the other species, by an abundant fur. *Pityriasis nigra,* as the name implies, is characterized by a dark colour of the skin.

Causes.—*Predisposing.*—Youth and old age; female sex; debility.

Exciting.—Irritation of the skin by heat, by the strong rays of the sun, or by chemical or mechanical irritants.

Diagnosis.—The abundant branny scales on an efflorescence consisting of an aggregation of small circular spots of a red, yellow, or black colour, distinguish this from all other diseases of the skin.

Prognosis.—Unattended with danger, but generally obstinate and difficult of cure.

Treatment.—Cleanliness; tepid baths; and tonic and alterative medicines. Alkaline and lead lotions, the zinc or lead ointments, the ointment of nitrate of mercury, and sulphurous baths, are among the best local applications. The itching may be allayed by lotions containing prussic acid.

ICTHYOSIS—FISH SKIN.

Symptoms.—This disease consists in the formation over the whole body, or on certain parts only, especially the palms of the hands, soles of the feet, face, eyelids, outer surface of the limbs, and around the joints, of a number of small, hard, thick, dry, dark-brown scales, overlapping each other, like the scales of a fish, without any accompanying inflammation, pain, or itching of the skin, and often attended with a very disagreeable odour.

Causes.—Obscure; hereditary predisposition. The disease is generally congenital.

Diagnosis.—It does not admit of being confounded with any other disease.

Prognosis.—Not attended with danger; but when hereditary, incurable, and when not hereditary, very obstinate.

Treatment.—The local treatment most likely to be of service is the vapour-bath, and strong stimulants to the skin, such as blisters, caustics, and the vapours of sulphur and iodine. The internal remedies indicated are arsenic, or some of its combinations, of which the best is the iodide of arsenic.

PELLAGRA—ITALIAN LEPROSY.

Symptoms.—This is a form of disease allied to psoriasis. It sets in in the spring of the year with dusky-red shining patches on the feet and back of the hands, which gradually spread, become studded with tubercles, and covered with dry scales, intersected, as in psoriasis, by cracks and excoriations. The disease, which is accompanied by slight itching, subsides and disappears towards autumn, to return the following spring in a more severe form, accompanied by anxiety, depression of spirits, and convulsive seizures. Towards the end of autumn the disease again subsides, but less completely; and re-appears early the following year. The disease now extends to every part of the surface, the skin being dry, tough, and shrivelled like that of a mummy. Extreme debility, diarrhœa succeeded by dysentery, dropsy, and epilepsy, follow each other, and wear the patient away, or usher in dementia or mania.

Causes.—Obscure. Common in Lombardy and the north of Italy.

Treatment.—The disease is not amenable to any kind of treatment.

ORDER VII.

TUBERCULÆ.

Lepra Tuberculosa	Elephantiasis.
Frambœsia	The Yaws.
Molluscum	Molluscum.

LEPRA TUBERCULOSA—ELEPHANTIASIS.

Synonyms.—Elephantiasis Græcorum; lepra Egyptiaca; lepra Hebræorum.

Symptoms.—The disease commonly sets in with erythematous patches, upon which an eruption of soft, livid tumours, of variable size and irregular shape makes its appearance. The skin and the subjacent tissues are hypertrophied, and œdematous, and the parts affected ultimately attain an enormous size. The sensibility of the skin is at first heightened, but subsequently diminished. In very severe cases of the disease, the tubercles become inflamed and ulcerated, and discharge an offensive sanies, which concretes into black scabs. The adjoining textures, even to the bones, sometimes become implicated, and their structure completely changed. The constitutional symptoms are not well marked, and are merely such as result from the prolonged sufferings of the patient. The disease may occur on any part of the body, but the most common situations are the lower extremities and face.

Causes.—*Predisposing.* Hereditary taint; the causes of scrofula; certain climates.
Exciting. Obscure.

Diagnosis.—The disease cannot be easily confounded with any other.

Prognosis.—Generally unfavourable.

Treatment.—Stimulating applications externally, and arsenical preparations or cantharides internally, in combination with tonic infusions. Change of climate is sometimes beneficial.

FRAMBŒSIA—THE YAWS.

Symptoms.—The disease sets in, without any marked premonitory symptoms, in the form of clusters, of variable size and shape, of small dark-red spots resembling flea-bites. Upon these spots papulæ are developed, which degenerate into indolent vegetations, resembling, when they are found in circular groups, raspberries or mulberries. These vegetations are firm, slightly inflamed, and covered with thin dry scales. In some instances, they become the seat of ulceration, and of a yellow or bloody discharge, which concretes into scabs. The skin around the seat of the eruption is generally indurated.

Causes.—*Predisposing.* The climate of the West Indies, and of parts of America and Africa; scrofula. It is very rare among the white population.
Exciting. Contagion.

Diagnosis.—The appearance of the eruption is such as to prevent its being confounded with any other contagious disease.

Prognosis.—Generally favourable. It sometimes assumes a chronic form, and continues for years.

Treatment.—The local application of stimulating ointments, such as the ointment of arsenic, or of the binitrate, protiodide, or biniodide of mercury; caustic, or the actual cautery. Internally, tonics and alteratives, and mercurial preparations in small doses. In chronic cases, the preparations of arsenic. Warm and vapour baths and douches may also be used with advantage.

MOLLUSCUM.

Symptoms.—Numerous indolent tubercles, from the size of a pea to that of a pigeon's egg, of various forms, sessile or pedunculated, of the natural colour of the skin, containing an ætheromatous matter, unaccompanied by any constitutional disorder, and not attended by pain, inflammation, or ulceration. They may occur on any part of the body, make their first appearance in childhood, and generally continue during the whole of life.

Causes.—Obscure. One form of the disease is contagious.

Treatment.—Fowler's solution was administered by Bateman with success; and Biett has employed a solution of sulphate of copper with advantage.

ORDER VIII.

MACULÆ—SPOTS.

The diseases belonging to this order are of so little practical importance, that a very short notice of them will suffice. They consist either in change of colour (colorationes) or loss of colour (decolorationes). To the former belong the common freckle (lentigo), the molt (spilus), the several forms of nævus, and the liver-spot (ephelis); to the latter, the universal colourless state of the skin (albinismus), and the partial absence of colour (vitiligo). The only disease of this class requiring a distinct notice, with the exception of nævus, of which the treatment belongs to the surgeon, is ephelis.

EPHELIS—LIVER-SPOT.

Synonyms.—Cloasma; pannus hepaticus.

Symptoms.—The eruption is preceded and accompanied by slight itching. It consists of small round spots of a greyish or yellowish tinge, which increase in number, and coalesce so as to cover a large surface of the skin. It may be transient, or assume a chronic form, and continue for some months. Their most common seat is the fore part of the trunk, but they sometimes appear on the face.

Causes.—The action of the sun; errors in diet; suppression of accustomed discharges. Diseases of the liver?

Diagnosis.—Ephelis is easily distinguished, by its being a mere discoloration of the skin, without the formation of any distinct scale.

Prognosis.—*Favourable.* The disease is rarely of long continuance, and generally disappears without treatment.

Treatment.—The general treatment will consist in a regulation of the diet, with gentle aperients and alteratives, and a course of sulphureous waters. The local treatment consists in the use of slightly-stimulating washes, of which the sulphuret of potash (one ounce in a quart of water) is the best.

LUPUS—THE WOLF.

Synonyms.—Lupus vorax; herpes exedens; formica corrosiva.

Species.—Superficial, deep-seated, and tubercular lupus.

SYMPTOMS.—This disease, in all its forms, is characterised by its tendency towards destructive ulceration of the parts which it attacks. Its most common point of attack is the nose; but it may occur on other parts of the face, and very rarely on the trunk or extremities.

The *superficial* form of lupus is sometimes confined to the skin, from which the cuticle exfoliates, and leaves the true skin red and shining, and tender to the touch, and bearing a close resemblance to the recent scar of a superficial burn. The redness disappears on pressure. When the disease is arrested, it leaves the skin thin and shining, and as if seared by a hot iron. In other instances, the disease is tubercular. Numerous small, soft, red tubercles make their appearance, which remain stationary for a few weeks, months, or years, till they suddenly become inflamed and enlarged; their bases unite, and their summits ulcerate, forming an irregular-spreading ulcer, covered by a dark tenacious crust. The parts first attacked sometimes partially heal, leaving irregular cicatrices, which become the seat of fresh tubercles and of renewed ulceration. The most common seat of this form is the cheek, but it may occur on the neck and chest, and on the anterior surface of the extremities.

The *deep-seated* form of the disease generally attacks the alæ of the nose, and is often preceded by redness, swelling, and mucous discharge from the nostrils. The skin first swells and assumes a violet-red colour. After an interval of time a small ulcer forms, which is covered by a scab, beneath which a gradual destruction of the part takes place, first of the skin, and then of the cartilages of the nose; the part is often extremely painful. In extreme cases, the whole nose and even the palate and gums are destroyed; but in some instances, the disease lasts for years without occasioning any great amount of destruction.

Lupus with hypertrophy is generally confined to the face, and consists in the formation of numerous soft, indolent tumours, which rarely ulcerate, but enlarge at their bases, and the skin and cellular tissue become hypertrophied. The entire face, in this manner, sometimes attains an enormous size, and is hideously disfigured.

These forms may exist together, leading to the destruction of the nose, eyelids, and lips, and producing very great deformity. They are rarely accompanied by any marked constitutional symptoms.

CAUSES.—*Predisposing.* The periods of childhood and youth; less frequently the adult age up to 40; the female sex; the scrofulous diathesis.

Exciting. Obscure. It is not contagious.

DIAGNOSIS.—From *acne*, by the absence of pustules. From *tubercular lepra*, by the insensibility of the skin, and the peculiar fawn colour of the tubercles in this latter disease. From *cancer* by the latter beginning in a single point, surrounded by a hard, circumscribed base, and accompanied by severe darting pains; the ulcers presenting a fungous appearance. From *syphilis*, by the peculiar copper tinge of the syphilitic eruption, and the coexistence of other secondary symptoms. From *impetigo*, by the character of the crusts, which in lupus are dark-brown, thick, and adherent: in impetigo, yellow, rough, and loosely attached.

PROGNOSIS.—*Favourable*, when recent and limited. *Unfavourable*, when of long continuance and extensive.

TREATMENT.—This must be chiefly local, and will consist, where the ulceration has not set in, of friction with stimulating ointments containing the iodides of sulphur, mercury, or ammonia. When ulceration has set in, caustics must be used, such as nitrate of silver, caustic potass, the chlorides of antimony or zinc, the nitrates or iodides of mercury, and the preparations of arsenic; the animal oil of Dippel has also been recommended. The best applications contain arsenic. A powder which bears the name of Dupuytren, consists of one or two grains of arsenious acid to an ounce of calomel, and is to be applied in small quantity to a limited surface of the skin. The arsenical powder of Frère Côme is a more powerful remedy, and consists of arsenious acid ten grains, sulphuret of mercury two scruples, animal charcoal ten grains. It must be used with caution, and applied to a small surface at a time. A strong solution of bicyanuret of mercury (3 or 4 grains to an ounce of water) is strongly recommended by Dr. Burgess. A lotion containing one part of chloride of zinc to four of water, is recommended by Dr. Byron. Among the internal remedies which deserve a trial, Mr. Donovan's solution (see Formulæ) may be mentioned.

CHELOIDEA.

SYNONYMS.—Cancroide; keloide.

SYMPTOMS.—This is a rare disease, appearing as small, hard, indolent tubercles, generally isolated; but sometimes occurring in groups, with intervals of sound skin between them; they are of an irregular oval, square, or angular shape, of a rose or a red colour, with a depressed centre, and covered with a thin layer of wrinkled cuticle; and having a remote resemblance to a crab or tortoise—whence its name. The usual situation of these tumours is the space between the mammæ. They are generally chronic, and unattended with danger.

DIAGNOSIS.—From *cancer*, by the small, round, livid tumour, surrounded by dilated veins; and, in its more advanced stage, by the open ulcer, and the enlarged lymphatic glands.

TREATMENT.—The local application of the sulphurous douche, of plasters containing iodine, or iodine and opium, and alkaline baths.

SYPHILIDA—SYPHILITIC ERUPTIONS.

Syphilitic eruptions may assume a great many different forms. They may be exanthematous, vesicular, pustular, tubercular, papular, or scaly; and they may occur either soon after infection,—in which case they are usually accompanied by other constitutional symptoms, and are termed *primary*—or they may come on after an interval, more or less considerable, and then they are termed *secondary*. The appearances which distinguish the several syphilitic eruptions from those which most nearly resemble them, are *the colour*, which is coppery, and most distinctly perceived on putting the skin on the stretch; *the form*, which is generally circular; and *the situation*, which is most commonly the face, forehead, and nose, and the back and shoulders. The scales where they exist, are of a dusky colour, thin, and dry; and the scabs, of a greenish tint, thick, dry, and cracked.

If the appearance of the eruption is not sufficiently characteristic, our diagnosis will often be materially assisted by the history of the case, and by the symptoms which have preceded or accompanied it. the most common accompaniments of the syphilidæ, are ulcerations of the tonsils or palate; periostitis, which attacks chiefly the tibia, ulna, and bones of the skull; and iritis. Ulcers of the sides of the tongue, and the thickening of the mucous membrane covering its surface, are less common accompaniments.

The treatment of syphilitic eruptions consists in the cautious use of the protochloride or bichloride of mercury, or the iodide of potassium in full doses. The protiodide of mercury is also an excellent medicine in obstinate cases. The muriate of gold, (dose, one-tenth of a grain,) and the subcarbonate of ammonia, in full doses, may be mentioned among the remedies which have been used with success. Among local applications, which are chiefly required in the tubercular form, may be mentioned the protonitrate, and the iodides, of mercury, in the form of ointment, and the iodide of sulphur. Warm vapour and sulphur baths and douches may also be used with advantage. In very severe cases, opium in full doses may be advantageously combined with the other remedies; and when the skin is very irritable, lotions containing the cyanide of potassium. It is usual to administer guaiacum, sarsaparilla, or mezereon in secondary cases; but these remedies ought to be made subsidiary to the more powerful and certain preparations of mercury or iodine.

GENERAL OBSERVATIONS ON DISEASES OF THE SKIN.

The great variety of skin diseases, the minute differences which distinguish some of their forms from those most nearly allied to them, the different appearances exhibited by the same disease in different stages of its course, and the difficulty occasionally experienced in distinguishing even those belonging to different orders when the characteristic appearances have been effaced by friction or supervening inflammation, render it particularly necessary to lay down such general rules of treatment as it may be possible to frame for all diseases of the skin, by whatever name they are known. Such general observations must, of course, be received and acted on with the reserve which should always characterise the application of general rules to particular cases.

There is one class of skin diseases, the febrile exanthemata, (of which the more important have been described in Chapter IV. of this work,) which run their appointed course, and can be treated only by remedies affecting the system at large.

There is a second class of skin diseases which, though not usually accompanied by severe general symptoms, require constitutional remedies—namely, the several syphilitic eruptions, which are removed by the same remedies that cure other secondary symptoms—viz.,—the preparations of mercury and iodine. In the majority of these cases, no local remedies will be required; but should they be deemed necessary, the same principles will guide us in our selection as preside over the choice of local remedies in other diseases of the skin. As these diseases are essentially chronic, stimulant applications are indicated, and of these the best will be such as assist us in our general treatment—viz., the preparations of mercury or iodine.

Another class of skin diseases also requires constitutional treatment—those which occur in scrofulous constitutions, or in impaired states of health—that treatment being such as would be adopted in scrofula, whatever form it assumes, and in similar impaired states of constitution. The local treatment will, in such cases, be governed by the same general principles as apply to similar states of skin; but it may be laid down as a general rule that scrofula, being a disease characterised by want of power, the local application should be of a somewhat stimulating character.

A fourth class of skin diseases requiring constitutional treatment, consists of those in which, whatever may be the form of the eruption, the skin is the seat of inflammation. In all such cases, those remedies are indicated which are effectual in the cure of inflammation of other parts. Of all these remedies, the most effectual is tartar-emetic in the dose of an eighth of a grain or more, either alone, or in combination with small doses of the milder preparations of mercury, or with saline aperients. General or local depletion may be necessary in extreme cases.

A fifth class of cases requiring constitutional treatment consists of those obstinate chronic diseases of the skin, which are found to resist all local applications, and the more simple constitutional remedies, such as aperients, alteratives, and tonics. In such cases, experience has shown the great benefit to be derived from small doses of arsenic, cantharides, phosphorus, or the biniodide of mercury, which probably act by inducing a peculiar condition of the capillary vessels.

These are the five leading cases of skin disease which especially require constitutional treatment. The general remedies administered in other cases will depend upon the age and existing state of health. In the young and robust, mild antiphlogistic treatment and regimen; in the aged and feeble, tonics or stimulants, according to the degree of the existing debility, and the more or less advanced age of the patient; in dry states of skin antimonials and sudorifics; in the pruriginous eruptions, alkaline medicines; in eruptions attended with copious exudation, the mineral acids.

In all cases of skin disease, it is important to attend to the state of the digestive organs. The bowels should be kept free, and alterative remedies should be given, if the functions of the liver are sluggishly performed; and dyspepsia must be met by the remedies appropriate to its existing form.

The *local* treatment of skin diseases, where no particular application is recommended by experience, must be regulated in a great, degree, by the presence or absence of marks of severe inflammatory action.

Where much inflammation is present, simple water-dressing, cooling washes and ointments, and emollient lotions and baths, will be required, aided in some cases by the application of leeches near the seat of the eruption.

When inflammation is absent, an opposite plan of treatment is necessary, and we must endeavour to establish common inflammation by the aid of stimulant ointments and washes, in the hope of superseding by this means the peculiar and often languid action of the vessels. Ointments of sulphur, iodine, and mercury, lotions of the bicyanuret of mercury and bisulphuret of carbon, and the vapours of sulphur and iodine, are among the most efficient local stimulants.

The more obstinate skin diseases, as well as those which are accompanied by rapid destruction of the textures of the skin, require the use of still stronger stimulants and escharotics, among which the most effectual are the nitrate of silver, arsenical paste or powders, the acid nitrate of mercury, the chloride of zinc, and phosphorus.

When there is extreme irritability of skin, with or without inflammation, sedative lotions, such as the decoction of poppy-heads or dulcamara, or applications containing prussic acid, may be used with advantage. In eruptions accompanied by much exudation, the dilute mineral acids would seem to be indicated, and alkaline washes in pruriginous eruptions.

There is one disease, scabies, which depends on the presence of a peculiar insect, the acarus scabiei: this is destroyed by sulphur and by other strong stimulants.

Several formulæ for the local treatment of skin diseases will be found in the collection of Formulæ, under the title "External Stimulants, containing Preparations of Mercury, Arsenic, Iodine, Phosphorus, &c.;" and for their constitutional treatment under the head of "Alteratives."

For more minute information on the treatment of the several skin diseases, the reader is referred to works written expressly on that subject. As it is one which can scarcely be understood without the aid of plates, minute detail would be of little use in this place, even if the limits of this work allowed of it.

CHAPTER IX.

PARASITIC ANIMALS.

1. Intestinal Worms.
2. Filaria Medinensis, or Guinea Worm.
3. Other Parasitic Animals.

INTESTINAL WORMS.

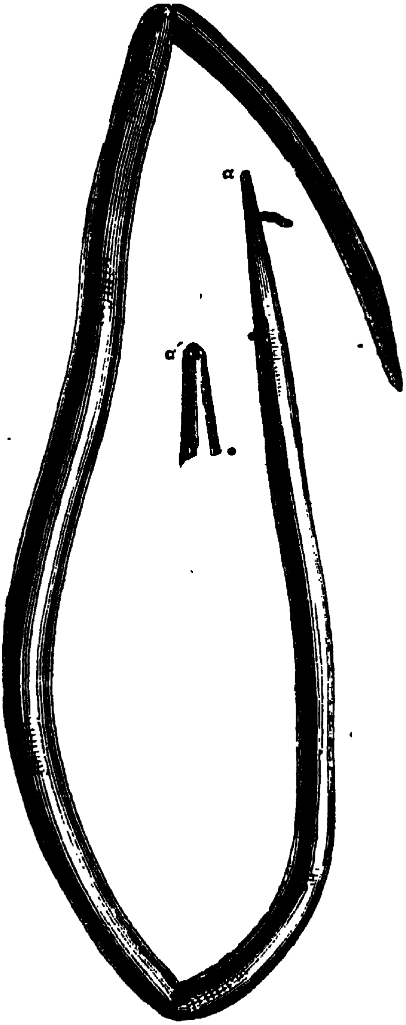
1. ASCARIS LUMBRICOIDES	Round Worm.
2. ASCARIS VERMICULARIS	Thread Worm.
3. TÆNIA	Tape Worm.

ASCARIS LUMBRICOIDES. ROUND WORM.

SYNONYM.—Lumbricus or Lumbrici.

SYMPTOMS.—These vary with the part of the alimentary canal occupied by the worm, and with the number of the worms, which is generally considerable, though there is sometimes only one worm. The symptoms commonly present are an uneasy sensation in the abdomen, sometimes amounting to actual pain, which is often described as a biting or gnawing pain; hardness and swelling of the belly; an irregular state of bowels, with scanty evacuations of mucus; sometimes tinged with blood, tenesmus, and in some cases, dysuria; a variable and sometimes excessive appetite; fœtid breath, and furred tongue. There is also a sensation of itching at the nose and anus, which leads the patient to scratch and pick those parts. The patient also grinds his teeth in his sleep. Increased flow of saliva and bleeding from the nostrils are among the occasional symptoms. The constitutional symptoms are those of infantile remittent fever (see p. 296), with a more marked degree of nervous affection. In young children convulsions are often traceable to this cause. It has also given rise to chorea, headache, giddiness, and disordered vision; to dry cough and spasmodic asthma; to violent palpitations, and severe hysterical symptoms. In some instances the general health has not suffered in any appreciable degree.

DIAGNOSIS.—There is no certain sign of the presence of these worms in the intestinal canal. Their presence in the canal is first revealed when they are discovered in the motions, either with or without the operation of medicines. In some cases they have been discharged from the stomach by vomiting, and have occasionally been found in abscesses communicating with the intestines. Their common habitation is the small intestines. The size of the worm varies considerably. The annexed woodcut shows it of a common size and proportion with the head, *a*, magnified about fourfold. (From a specimen in the museum of King's College.)



PROGNOSIS.—These worms when once proved to exist may generally be removed by appropriate remedies.

CAUSES. — *Predisposing.* The period of childhood and youth. A cachectic state of constitution; undigested food in the alimentary canal; unripe fruit and vegetables; bad water.

Exciting. It is probable that the ova are introduced into the alimentary canal with the food or drink.

TREATMENT. — *Indications.* I. To cause the expulsion of the worms. II. To improve the general health and the functions of the alimentary canal, so as to guard against their recurrence

I. The first indication is fulfilled (*a*) By the use of brisk aperient medicines. (*b*) By the use of anthelmintics. (*c*) By the administration of anthelmintics followed by brisk aperient. (*d*) By aperients or anthelmintic injections.

(*a*). The best aperient medicines are calomel, jalap, scammony, colocynth, and aloes. A good combination for children consists of calomel and jalap in equal quantities, and in doses proportioned to the age; and for adults five grains of calomel with five grains of extract of colocynth. The powder or pills should be taken on an empty stomach, and should be followed within two or three hours by a full dose of castor oil. Should these aperients fail, a table-spoonful of oil of turpentine may be substituted for the first aperient, followed as before by a full dose of castor-oil.

(*b*) *Anthelmintics* are of two classes, those which act mechanically, and those which act by poisoning the worm. To the first class belong cowhage, and the coarse powders of metallic tin, iron, or zinc, with metallic mercury; to the second class belong the root of the spigelin marylandica, of the male fern, or of the kosso; the bark of the pomegranate, and the rind of the walnut; the entire class of bitters, such as wormwood, rue, tansy, garlic, savin, chenopodium, and santonica; also assafœtida, camphor, turpentine, copaiba, common salt, and the essential oils and ethereal extracts of the plants mentioned above.

(*c*) The anthelmintic which may be selected for use should be given on an empty stomach, and should be followed, in two or three hours, by a full dose of castor-oil (an ounce for the adult), as recommended above) with turpentine and castor-oil.

(*d*) A strong solution of common salt in weak gruel, is a suitable enema, as is also oil of turpentine in the proportion of one ounce to the pint. Either of these may be employed if there is reason to believe that the worms occupy the large intestines. It has been proposed to destroy the worm by injections of infusion of tobacco, or of tobacco smoke; also by shocks of electricity sent through the abdomen.

II. The second indication is fulfilled by all means tending to improve the general health, by due regulation of the diet, and by keeping the bowels in an open state. Dyspeptic symptoms must be treated according to the rules laid down under Dyspepsia (see p. 469). Excess in eating must be avoided, and unripe fruits and raw vegetables should be forbidden.

ASCARIS VERMICULARIS—THREAD-WORM.

SYNONYMS.—Ascarides. Maw-worm.

SYMPTOMS.—As this worm, though not confined to those parts of the alimentary canal, is chiefly to be found in the large intestines, and especially in the rectum, and in considerable numbers, there is an unusual amount of irritation at the verge of the anus. In consequence of the small size of the worms, they are not only found in the evacuations, but crawl out of the rectum, so as to be found in the clothes or in the bed of the patient, and in females they find their way into the vagina, and cause irritation there. The constitutional symptoms are those described above. (See Ascaris Lumbricoides, p. 590).

Fig. 1.

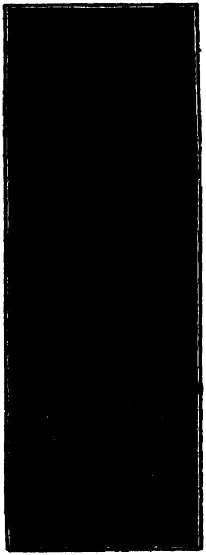
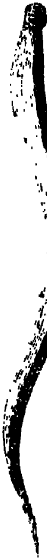


Fig. 2.

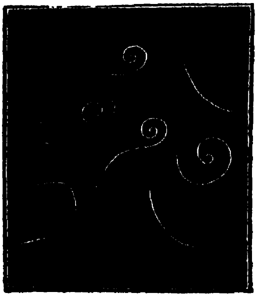


DIAGNOSIS.—The only certain proof of the existence of these worms is the discovery of them in the evacuations, or on the person of the patient. The worms are shown of their usual size in Fig. 1, and greatly magnified in Fig. 2.

PROGNOSIS. — These worms are easily expelled by remedies; but in consequence of their large numbers and rapid production, it is not easy to insure their complete expulsion. They are also very liable to recur.

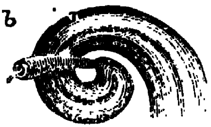
TREATMENT.—As the usual seat of these worms is the rectum, injections are more strongly indicated than in the case of other intestinal worms. They are, however, discharged in considerable numbers by the use of aperients. The treatment, therefore, consists in a combination of brisk aperient medicines, with purgative enemata, should the medicines alone prove insufficient. In children, a combination of equal parts of calomel and jalap, in a dose proportioned to the age, and in adults five grains of calomel and five grains of colocynth, followed in either case by a full dose of castor-oil, is a suitable form of aperient. The best enemata consist of a strong solution of common salt, or a moderate quantity of oil of turpentine in weak gruel. Of the first, one or two ounces to the pint; of the second, one ounce to the pint.

Fig. 1.



There is another species of thread-worm commonly found in the cæcum and colon, and known as the TRICHOCEPHALUS DISPAR, TRICHURIS, or LONG THREAD-WORM. It is distinguished from the common thread-worm by its greater length, and by the extreme tenuity of the anterior two thirds, and the increased size of the posterior third of the body. Also, in the case of the male, by the peculiar form of the spiculum and sheath, shown greatly magnified at *b* (Fig. 2). The posterior part of the body is commonly found coiled up as in Fig. 1, which shows the worm of its natural size. (From Dr. Hooper's collection in King's College Museum.)

Fig. 2.



The treatment is that of the common thread-worm; but injections are less necessary.

TÆNIA—TAPE-WORM.

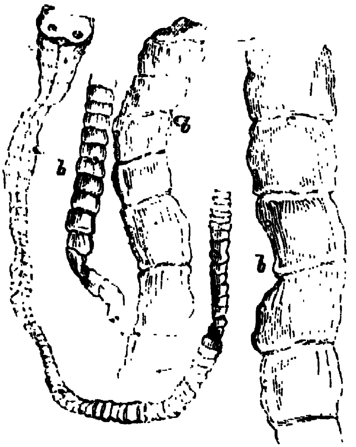
SPECIES.—1. Tænia solium: or common tape-worm. 2. Tænia lata: or broad tape-worm.

1.—TÆNIA SOLIUM.—COMMON TAPE-WORM.

SYNONYM.—Long tape-worm.

SYMPTOMS.—Those already described (see Ascaris Lumbricoides, p. 590.) The tape-worm occupies the whole track of the intestines, but principally the ileum. Joints of the worm frequently pass in the evacuations, even without medicine.

DIAGNOSIS.—There are no symptoms by which the tape-worm can be distinguished from other intestinal worms. Its appearance is quite characteristic, and the joints, when expelled from the bowels, may be readily recognised. The worms vary in length from four to ten feet, and sometimes occupy the whole length of the intestinal canal. The annexed engraving shows three segments of the worm (*b b b*) of their usual size; and the head and upper extremity magnified by a common lens. The head is from a preparation by Dr. Lionel Beale. Two of the osculæ are distinctly seen, the other two are only slightly indicated by slight depressions upon the upper margin.



PROGNOSIS.—It is easy to remove considerable portions of the worm by proper remedies. The entire worm is less frequently expelled. Search should always be made for the head. Until this is expelled, the patient is not effectually relieved. When any number of the small joints at the upper end of the worm are expelled, there is a probability in favour of the head having also been removed.

Causes.—Obscure.

Treatment.—That of the ascaris lumbricoides (p. 590). The following are the best remedies:—

(*a.*) Oil of turpentine, in the dose of half an ounce, followed in two hours by an ounce of castor-oil. This treatment rarely fails of removing the tape-worm, but it is open to the objection that the turpentine acts as a stimulant to the brain and urinary organs, sometimes producing painful strangury. It is much less apt, however, to produce this effect if speedily followed by the castor-oil.

(*b.*) The root of an Abyssinian plant called the kosso, in the form of infusion (ʒvi. to Oss. of water), taken at a single dose. This is an extremely effective remedy.

(*c.*) The essential oil of the male fern in the dose of ʒi. or ʒiss. It may be given in capsules.

(*d.*) The ethereal extract of the root of the male Shield-Fern (Lastræa Filix Mas) first proposed by M. Peschier, and since revived and strongly recommended by Dr. Christison. It would seem to be the most uniformly successful remedy yet employed. (See the Monthly Journal of Medical Science, July 1853.) The dose is from 18 to 24 grains, and no laxative medicine is required.

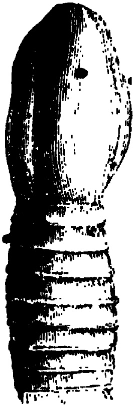
For other anthelmintics, see Ascaris Lumbricoides, p. 590.

2. TÆNIA LATA, OR BROAD TAPE-WORM.

Synonym.—Bothriocephalus latus.

Symptoms.—Those of the ascaris lumbricoides (p. 590). The bothriocephalus latus is very rare in England. It is common in Switzerland and Russia, and occurs in France, in common with the tænia solium, which latter is the species found in England.

Diagnosis.—This is readily distinguished from the common tape-worm by the peculiar shape of the head, which is marked in the direction of its length by two fossæ, and by the shape of the sections which are much broader than they are long. The head and some of the upper segments are shown in the subjoined engraving, from a specimen in the Museum of King's College.



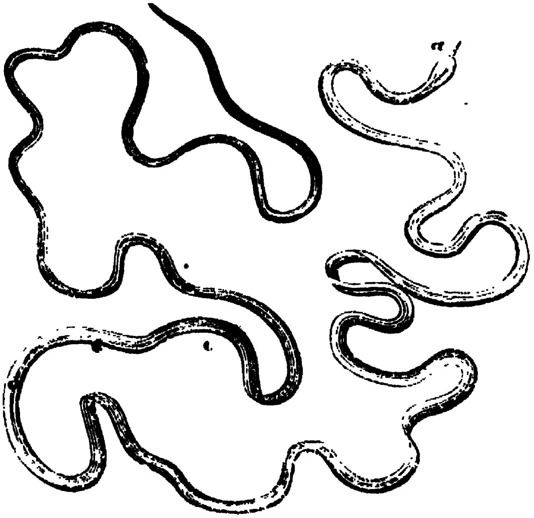
Treatment.—That of the common tape-worm. (See above.)

FILARIA MEDINENSIS—GUINEA-WORM.

SYNONYMS.—Dracunculus. Hair-worm.

SYMPTOMS.—An itching sensation is first felt in the skin of some part of the upper or lower extremities; most frequently in the lower extremities, and especially in the feet. This itching sensation is soon followed by the appearance of a small vesicle, succeeded by an indolent inflamed swelling like a boil, which breaks and discharges its contents, revealing the head of the worm, which gradually protrudes through the opening, so that it may easily be seized. Much skill and care is requisite in order to withdraw the worm without breaking it. If the operation is unsuccessful, acute inflammation and extensive suppuration supervene, and, in some cases, mortification.

DIAGNOSIS.—The length of the worm varies from half a foot to twelve feet. Its form and size are shown in a subjoined engraving of a worm extracted from the heel of a negro, and preserved in the Museum at King's College. The form of the tail is seen at *a*. The head is of a darker colour than the body.



CAUSES.—*Predisposing*. The tropical regions of Asia, Africa, and especially Upper Egypt, Nubia, and Guinea.—*Exciting*. It is supposed that the worm in an embryo state pierces some exposed portion of the skin.

TREATMENT.—The worm requires to be very cautiously and patiently extracted, being wound upon a small quill, or roll of cotton, as it protrudes. During the inflammatory stage, suppuration should be promoted by the common bread-poultice.

PROPHYLAXIS.—When the disease prevails among bodies of men, the sick should be separated from the sound; and scrupulous cleanliness should be insisted on.

OTHER PARASITIC ANIMALS.

In addition to the species described in the preceding pages, there are several varieties of parasitic animals, or entozoa, of which some are to be found in all, or in most of the principal textures and organs of the body, while others infest particular organs or textures only.

To the first class belong the two species of hydatids, the Acephalocystis, and the Echinococcus, which consist in common of a globular laminated sac, enclosing a transparent liquid. They are both nourished by imbibition, occupy for the most part the solid viscera of the body, and are generally contained in a cyst formed by the surrounding cellular tissue. The cysticercus, one of the entozoa, which is somewhat allied to the true hydatid, has also been found in more than one organ of the body.

To the second class belong the *Filaria oculi*, and the *Filaria bronchialis*, named from the parts which they infest; the *Trichina spiralis*, found in the muscles; the *Distoma hepaticum*, or liver-fluke; and the *Strongylus gigas*, which makes the kidney its habitat.

The *symptoms* produced by these entozoa are due, in part, to the enlargement they occasion, in part, (as in the case of the strongylus gigas), to the destruction which they cause, and in part to the inflammation which often follows their death. The trichina spiralis, however, does not appear to affect the functions of the muscles, or the general health.

The *treatment* of parasitic animals will be determined by the symptoms which they occasion. No precise rules can therefore be laid down. It has been proposed to employ electricity for the purpose of destroying entozoa; and it has been also suggested that we should administer camphor and the volatile oils internally, with a view of poisoning them.

CHAPTER X.

POISONS.

THE subject of Poisons is here treated simply as a branch of the Practice of Medicine. For the tests of the several poisons, and the more minute details respecting them, the reader is referred to works on Toxicology, or Forensic Medicine. The antidotes for the principal poisons will be found appended to the Formulæ.

1. Irritant Poisons.
2. Narcotic Poisons.
3. Narcotico-Irritant Poisons.

1. IRRITANT POISONS.

DEFINITION.—Poisons which cause inflammation or irritation in the alimentary canal, with or without specific remote effects on other organs of the body.

SYMPTOMS.—After an interval varying from a few seconds to half an hour or more from the swallowing of the poison, vomiting and purging, with pain in the stomach and bowels, increased by pressure; and accompanied by inflammatory fever, or extreme prostration of strength. Pain and constriction of the mouth, throat, and gullet, accompanying or following the act of swallowing; hoarse voice, wheezing respiration, and cough; discharge of blood from the stomach and bowels; tenesmus; strangury, dysuria, or suppression of urine; convulsions and epileptic seizures; and cutaneous eruptions, are symptoms of more or less frequent occurrence, but not present in every instance. The remote constitutional effects, whether common to other severe injuries, or specific, are also subject to great variety.

MORBID APPEARANCES.—Marks of corrosion, inflammation, suppuration or gangrene in the stomach and upper part of the alimentary canal, extending, in certain cases, to the gullet, throat, and mouth, and through the whole length of the intestines. Perforation of one or other of these parts. In certain cases, signs of inflammation in the windpipe and lungs; in the peritoneum and pleura; in the rectum and bladder. In certain other cases, peculiar stains or indications of the action of the poison on the mouth, throat, gullet, stomach, and duodenum.

DIAGNOSIS.—*During life*, from English and Asiatic cholera, in many cases of irritant poisoning, by the blood mixed with the evacuations from the stomach and bowels, and in many other cases by the effect of the poisons upon the mouth, throat, and gullet. In other instances, again, by the specific remote effects of the poison. *After death*, by the traces of acute inflammation, and its consequences on the several portions of the alimentary canal; and in many cases by appearances in the upper part of the canal appropriate to particular irritant poisons.

PROGNOSIS.—Dependent on the nature of the poison, the degree of concentration, the vehicle, the dose, the prompt administration or otherwise of an antidote, the state of the stomach (whether full or empty) when the poison was swallowed, and the age and strength of the patient.

MORTALITY.—The mortality varies in the case of the several poisons contained in this class, from a large proportion of the cases down to a rarely fatal result.

TREATMENT.—After the administration of an antidote (if any exist) the prompt and complete evacuation of the stomach by the stomach-pump (except in the case of the strong corrosive poisons) or by emetics of common salt, mustard, ipecacuanha, or sulphate of zinc, assisted by large draughts of warm water, and tickling the throat with a feather or with the finger. After the evacuation of the stomach, the free use of milk, gruel, barley-water, and abstinence from all solid food. When inflammation runs high, ice or iced-water; when great tenderness is present, leeches followed by warm fomentations. When the bowels cease to discharge blood, and the patient suffers from tenesmus or constipation, one or two tablespoonfuls of castor-oil, with twenty drops or half a drachm of laudanum, mixed with a small quantity of hot milk. Extreme prostration will require the use of larger doses of laudanum, with wine or brandy. When fever runs high, it may be necessary to draw blood from the arm. Occasional symptoms, and symptoms peculiar to certain poisons only, must be treated in the same manner as the same symptoms due to other causes.

2. NARCOTIC POISONS.

DEFINITION.—Poisons which act on the brain and spinal marrow, and give rise to symptoms referable to those organs, without exciting any irritation or inflammation of the alimentary canal.

SYMPTOMS.—After an interval varying from a few seconds to one or two hours from the swallowing of the poison, the patient is seized with giddiness, headache, dimness of vision, singing in the ears, drowsiness passing into stupor, and ending in complete coma, with palsy, convulsions, epileptic fits, or tetanic spasms.

Morbid Appearances.—Often very slight. The brain sometimes healthy; the veins and sinuses sometimes gorged with blood, with serum in the ventricles and at the base. In rare instances extravasation of blood.

Diagnosis.—From the close resemblance of the symptoms of some forms of narcotic poisoning and apoplexy, no satisfactory diagnostic marks can be laid down for narcotic poisons as a class; and in any case the history of the first appearance and progress of the symptoms will constitute our principal means of distinction.

Prognosis.—This too cannot be laid down for the entire class, as the chances of recovery vary very greatly with the particular poison which has been taken.

Treatment.—The prompt use of the stomach-pump, and, until that can be procured, the administration of emetics of common salt, mustard, ipecacuanha, and sulphate of zinc. The cold affusion as a shock, especially in the early stage of the poisoning. The patient to be kept awake by walking him up and down, or by flecking his hands and feet with a wet towel. After the complete evacuation of the stomach, strong coffee and tea, and diffusible stimulants to be freely administered. The bowels to be relieved by full doses of castor-oil. So long as the surface continues cold and livid, the heat to be restored by assiduous frictions, and by warm bottles to the feet, and pit of the stomach, or by the hot-air bath. In extreme cases artificial respiration, and galvanic shocks passed from the spine of the neck to the pit of the stomach.

3. NARCOTICO-IRRITANT POISONS.

Synonym.—Narcotico-acrids.

Definition.—Poisons which produce the combined effects of the irritant and narcotic poisons, the irritant action being generally less violent than in the case of the pure irritants, and delirium being of more common occurrence among the symptoms referable to the nervous system.

Symptoms.—At an interval varying from about an hour to three or four hours after swallowing the poison (which, in many cases, has a peculiar taste), giddiness, disorders of the senses of sight and hearing, delirium, convulsions, tetanic spasms, stupor passing into coma; preceded or accompanied by vomiting and purging, with pain and tenderness of the abdomen. As a general rule the narcotico-irritants act chiefly or wholly as narcotics in very large doses, and mainly as irritants in small doses.

MORBID APPEARANCES.—Not strongly marked or uniform, consisting of marks of inflammation in the stomach and intestines, with congestion of the brain.

DIAGNOSIS.—From most of the pure irritants by the presence of symptoms of narcotic poison; from the pure narcotics by the presence of more or less of irritation in the alimentary canal; also in many cases by the presence of delirium, and in other instances by the violent tetanic spasms.

PROGNOSIS.—Dependent chiefly on the early or late commencement of the treatment, and on the circumstances mentioned under the head of Narcotics.

TREATMENT.—The prompt use of the stomach-pump, or of emetics, followed by aperients and enemata, if required. The rest of the treatment to be determined by the symptoms present; if chiefly those of irritant poisoning, the treatment proper to that class of poisons (p. 598); if chiefly of narcotic poisoning, the treatment prescribed under narcotic poisons (p. 599).

FORMULÆ.

The doses are full doses for the Adult Male, unless otherwise stated. For Adult Females the doses must be somewhat diminished, according to the judgment of the practitioner. In prescribing for younger persons of either sex, the subjoined table of doses may be safely followed. The dose for the adult male is taken at 60 *grains or* 60 *minims.*

Adult male	ʒ i	or 1
14 years	ʒss	or $\frac{1}{2}$
7 years	℈i	or $\frac{1}{3}$
5 years	♏ or gr. xv	or $\frac{1}{4}$
3 years	,, ,, x	or $\frac{1}{6}$
1 year	,, ,, vi	or $\frac{1}{10}$
6 months	,, ,, iii	or $\frac{1}{20}$
3 months	,, ,, ii	or $\frac{1}{30}$

(For the sake of brevity, the prescriptions for mixtures contain, with few exceptions, six ounces, which may be readily converted into draughts of an ounce or an ounce and a-half by dividing them into four or six parts. The mixture or draughts may be given every three, four, or six hours, or three times a-day, according to the circumstances of each case. The directions are generally omitted, as involving unnecessary repetition. As no good purpose is answered by couching the directions for taking medicine in Latin, English has been generally substituted.)

STIMULANTS.

I. GENERAL STIMULANTS.

(Including Diffusible Stimulants and Stimulant Antispasmodics.)

Preparations of the London Pharmacopœia, with their Doses.

1. Ammoniæ sesquicarbonas - - - - - - - - Dose gr. v — gr. x.
2. Liquor ammoniæ - - - - - - - - - - - - ,, ♏ x — ʒ ss.
3. Liquor ammoniæ sesquicarbonatis - - - ,, ʒ ss — ʒ ii.
4. Liquor ammoniæ acetatis - - - - - - - - , ʒ ii — ℥ ss.

5.	Liquor ammoniæ citratis	Dose f ʒ ii — f ℥ ss.
6.	Tinctura ammoniæ composita	,, ♏ x — ʒ ss.
7.	Spiritus ammoniæ	,, ♏ x — ʒ ss.
8.	Spiritus ammoniæ aromaticus	,, ♏ xx — ʒ i.
9.	Spiritus ammoniæ fœtidus	,, ʒ ss — ʒ ii.
10.	Ammoniæ hydrochloras	,, gr. x — ʒ ss.
11.	Æther (sulphuricus)	,, ♏ xx — ʒ i.
12.	Spiritus ætheris compositus	,, ʒ ss. — ʒ ii.
13.	Spiritus ætheris nitrici	,, ʒ i — ℥ ss.
14.	Spiritus rectificatus; tenuior; vini gallici. Mistura spiritus vini Gallici	
15.	Oleum anethi, anthemidis anisi, cajuputi, carui, caryophylli, cinnamomi, fœniculi, juniperi, lavandulæ, limonum, menthæ, (viridis et piperitæ), myristicæ, pimentæ, pulegii, rutæ, sabinæ, sassafras	,, ♏ iii — ♏ v.
16.	Spiritus anisi, armoraciæ compositus, carui, cinnamomi, juniperi compositus, menthæ (viridis et piperitæ), myristicæ, pimentæ, pulegii, and rosmarini	,, ʒ i — ℥ ss.
17.	Tinctura aurantii, calumbæ, capsici, cardamomi composita, cascarillæ, castorei, cinchonæ, cinchonæ composita, cinnamomi, cinnamomi composita, gentianæ composita, guaiaci composita, helleboræ, lavandulæ composita, limonum, lupuli, myrrhæ, quinæ comp. serpentariæ, valerianæ, zingiberis, and valerianæ composita	,, ʒ ss — ʒ ii.
18.	Camphor	,, gr. v — gr. x.
19.	Tinctura camphoræ composita	,, ♏ x — f ʒ i.
20.	Mistura camphoræ	,, f ℥ i — f ℥ ii.
21.	Spiritus camphoræ	,, ♏ x — f ʒ ss.
22.	Moschus	,, gr. v — ℈ i.
23.	Mistura moschi	,, f ℥ i — f ℥ ii.
24.	Assafœtida	,, gr. v — ℈ i.
25.	Tinctura assafœtidæ	,, f ʒ i — f ʒ ii.
26.	Oleum terebinthinæ	,, f ʒ i — f ℥ ss.
27.	Creasotum	,, ♏ i — ♏ ii.
28.	Phosphorus	,, gr. ¼ — gr. i.
29.	Potassæ chloras	,, gr. x — ℈ i.
30.	Liquor sodæ chlorinatæ	,, f ʒ i — f ℥ ss.
31.	Liquor calcis chlorinatæ	,, f ʒ i — f ℥ ss.

The mistura camphoræ, the distilled waters (aqua anethi, carui, cinnamomi, pulegii, pimentæ, menthæ,—viridis and piperitæ—), and the tonic infusions (infusum anthemidis, armoraciæ compositum, aurantii compositum, calumbæ, caryophylli, cascarillæ, cinchonæ, cuspariæ,

diosmæ, gentianæ compositum, krameriæ, lupuli, pareiræ, quassiæ, rosæ compositum, serpentariæ, and simarubæ) are appropriate vehicles for the stronger stimulants, and the tonic syrups (especially the syrupus aurantii and zingiberis) may be used to impart an agreeable flavour.

Stimulants in the form of Mixture and Draught.

1. ℞. Ammoniæ sesquicarb. ʒss.
Liq. ammoniæ acetatis f ℥iii.
Syrupi aurantii f ℥i M.
Aquæ f ℥ii.
(A sixth part for a dose.)

2. ℞. Tinct. ammoniæ C. f ʒii.
Mist. camphoræ f ℥v.
Syrupi zingib. f ʒvi M.
(A fourth part for a dose.)

3. ℞. Spirit. ammon. aromat. f ℥ss.
Tinct. lavandulæ C. f ℥i.
Aquæ cinnamomi f ℥iiiss.
Syrupi aurantii f ℥i. M.
A fourth part for a dose.)

4. ℞. Liq. amm. sesquicarb. f ℥ss.
Tinct. guaiaci ammon. f ℥ss.
Decocti cinchonæ f ℥v. M.
(A sixth part for a dose, in chronic rheumatism of the aged.)

5. ℞. Guaiaci pulv. ʒi.
Tinct. guaiaci ammon. f ℥ss.
Pulv. acaciæ ʒii.
Syrupi croci f ℥ss.
Aquæ pulegii f ℥v. M.
(A fourth part for a dose; in chronic rheumatism.)

6. ℞. Ætheris (sulphurici) f ℥ss.
Mist. camphoræ f ℥vss. M.
(A fourth part for a dose.)

7. ℞ Spirit. ætheris C.
Tinct. lavand. C. āā f ℥ss.
Infus. aurantii C. ℥v.
(A fourth part for a dose.)

8. ℞. Spirit. ætheris C. f ℥i.
Spirit. ammon. aromat. f ℥ss.
Spirit. cinnamomi f ℥ss.
Infus. cascarillæ f ℥iv.
(A sixth part for a dose, or, in states of extreme debility, a fourth part.)

9. ℞. Ammoniæ sesquicarb. ℈ii.
Ætheris (sulphurici) ℥ss.
Mist. camphoræ f ℥ivss.
Syrupi zingiberis f ℥i.
(A sixth part for a dose, or as No. 8.)

10. ℞. Camphoræ ℈i.
Spirit. rectificat. ♏v.
Reduce the camphor to a powder, then add—
Pulv. acaciæ ℥ss.
Syrupi limonum f ℥ss.
Aquæ menthæ viridis f ℥vss.
(A stimulant emulsion; a sixth, or a fourth, part for a dose.)

11. ℞. Camphoræ ℈i.
Mellis f ℥i.
Mix the two in a mortar, and add—
Spirit. ætheris C. f ℥ss.
Mist. moschi ℥ii.
Aquæ destillatæ ℥iiss.
(A fourth part for a dose.)

12. ℞. Mist. moschi f ℥iv.
Spirit. æther. C.
Syrupi aurantii āā f ℥i. M.
(A sixth part for a dose.)

13. ℞. Spirit. ammon. fœtid. f ℥i.
Mist. assafœtidæ f ℥v. M.
(A sixth part for a dose; in hysteria.)

14. ℞. Spirit. ammoniæ fœtid.
Tinct. valerianæ ammoniatæ āā f ℥ss.
Spirit. armoraciæ C. f ℥ii.
Aquæ pimentæ f ℥iii.
(A fourth part for a dose; in the same.)

15. ℞. Tinct. valerianæ C. f ℥ss.
Spirit. juniperi C. f ℥ii.
Aquæ pimentæ f ℥iiiss.
(A fourth part for a dose.)

16. ℞. Infus. rosæ C. f ℥v.
Vini rubri Hispanici f ℥ii.
Syrupi simplicis f ℥i. M.
(For an ordinary drink in states of debility.)

17. ℞. Radicis armoraciæ excisæ ℥ii.
Seminis sinapis ℥jss.
Baccæ juniperi contusæ ℥iii.
Vini albi Hispanici Oiii.
(Digest for one week, strain, and administer a wine-glass full two or three times a-day.)

18. ℞. Olei terebinth f ℥ss.
Mellis f ℥i.
Pulv. tragacanth ʒii.
Tinct. lavandulæ C. f ℥ss.
Aquæ f ℥iv.
(A fourth part for a dose.)

19. ℞. Olei terebinth f ℥ss.
Pulv. acaciæ ℥ss.
Spirit. juniperi C. f ℥ss.
Aquæ menthæ pip. f ℥v. M.
(A fourth part for a dose. This, the foregoing, or the next, in chronic rheumatism.)

20. ℞. Olei terebinth f ℥i.
Ovi vitellum unius.
Sacchari ℥ss.
Aquæ ℥iv. M.
(A fourth part for a dose.)

21. ℞. Creasoti ♏vi.
Pulv. tragacanth ℥ss.
Mist. camphoræ f ℥vi.
(A sixth part for a dose, in obstinate vomiting without organic disease, and in sea-sickness. The dose may be increased to a fourth. Also in acne rosacea.)

22. ℞. Potassæ chloratis ʒi
Syrupi rhæados f ℥i.
Aquæ destillatæ f ℥v.
(A sixth part for a dose. Is a supplier of oxygen, and useful in febrile affections and the febrile exanthemata.)

23. ℞. Spirit. ætheris nitrici f ℥ii.
Syrupi tolutani f ℥iv.
Pulv. acaciæ ℥ss.
(A tea-spoonful occasionally in teasing coughs.)

24. ℞. Phosphorus gr. iv.
Olei olivæ f ℥ss.
Digest for a fortnight in a dark place, then add—
Olei carui ♏iv.
(Dose 15 drops three times a-day, cautiously increased, in almond emulsion.)

Stimulants in the form of Pill or Powder.

25. ℞. Camphoræ.
Moschi āā ʒss.
Ol. cajuputi ♏v. vel q. s.
Ut fiat massa in pilulas xii dividenda. (Two pills to be taken every two or three hours.)

26. ℞. Creasoti ♏x.
Pulv. glycirrhizæ ʒi.
M. f. massa in pilulas xii dividenda. (One pill to be taken three times a-day; in neuralgia, chronic rheumatism, and bronchitis.)

27. ℞. Camphoræ.
Moschi āā gr. x.
M. f. pulvis. (To be taken in a small quantity of barley-water or thin gruel; in hysteria.)

28. ℞. Phosphorus gr. iii.
Ol. caryophylli ♏xii.
Pulv. glycirrhizæ q. s.
(Divide into twelve pills, and give one twice a-day. The quantity of phosphorus to be cautiously increased to a scruple. In lupus, obstinate scaly diseases, and syphilitic tubercles.)

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2. STIMULANTS ACTING LOCALLY UPON CERTAIN SYSTEMS OR PARTS.

ON THE MUSCULAR SYSTEM (in Paralysis).

Preparations of the London Pharmacopœia.

1. Extractum nucis vomicæ - dose gr. ½, gradually increased to gr. iii.
2. Pulvis nucis vomicæ - - ,, gr. v, gradually increased to ℈i.
3. Strychnia - - - - - - ,, gr. $\frac{1}{10}$ or $\frac{1}{20}$, cautiously increased to gr. i.

In the form of Mixture or Draught.

29. ℞. Pulv. nucis vomicæ ʒss.
Mist. acaciæ
Aquæ cinnamomi āā f ℥i.
Tinct. cardam. comp. f ℥i.
Aquæ destillatæ f ℥iii. M
(A sixth part for a dose.)

30. ℞. Strychniæ gr. i.
Aceti f ʒi.
Sacchari alb. ʒii.
Aquæ destill. ℥viii. M.
(A table-spoonful, being a sixteenth part, three times a-day).

31. ℞. Strychniæ gr. ii.
Spirit. rectif. f ℥i.
(Of this tincture the dose to be from 10 to 12 drops three or four times a-day, cautiously increased).

32. ℞. Strychniæ gr. i.
Spt. rectif. f ʒss.
Dissolve, and add—
Spt. ætheris nitrici f ℥iss.
Syrupi rhæados f ℥i.
Aquæ ℥v. M. f Mist.
(A table-spoonful for a dose to be taken three times a-day).

In the form of Pill.

33. ℞. Pulv. nucis vom.
Confect. rosæ āā ʒss.
M. f. massa in pilulas xii dividenda. (One pill to be given three times a-day).

34. ℞. Strychniæ gr. i.
Quinæ disulphat. ʒss.
Confect. rosæ ʒi.
M. f. massa in pilulas xx dividenda. (One pill for a dose).

ON THE UTERUS.

Preparations of the London Pharmacopœia.

Ergota or secale cornutum; dose ℈i—ʒss. Tinctura ergotæ ætherea, dose f ʒss—f ʒii.

35. ℞. Ergotæ ʒii.
Aquæ bullient. f ℥vi.
(A sixth part every twenty minutes for three or four doses in succession).

36. ℞. Ergotæ ℥ss.
Spt. vini rectif. f ℥iss.
(Of this tincture, give a tea-spoonful every half hour, till it takes effect).

(These preparations may be used in lingering labours dependent on deficient action of the uterus, or with a view of inducing premature labour in cases of deformed pelvis, &c. The ergot has also been used in the dose of ten grains every two hours, in hæmorrhage from the uterus, bladder, and lungs; and in five-grain doses three times a-day in leucorrhœa.)

ON THE BLADDER.

Preparation of the London Pharmacopœia.

Tinctura cantharidis. Dose ♏x cautiously increased.

In the form of Mixture or Draught.

37. ℞. Tinct. cantharidis f ʒi.
Infus. quassiæ f ℥vi.
M. f. mistura. (A sixth part three times a-day. In incontinence of urine from debility of the muscular coat of the bladder, and in obstinate gleet.)

38. ℞. Tinct. cantharidis f ʒi.
Tinct. ferri sesquichl. f ʒii.
Aquæ pimentæ f ℥vi.
M. f. mistura. (Dose, one table-spoonful three times a-day in anæmic or delicate children subject to incontinence of urine.)

In the form of Pill.

39. ℞. Cantharidis gr. ii.
Camphoræ
Ext. hyoscyami āā gr. x.
Spirit. vini rectif. ♏iii.
(Mix the camphor with the spirit, and then with the other ingredients; divide into four pills, and give one twice a-day.)

40. Cantharidis gr. vi.
Ferri sulphat. exsicc.
Ext. gentianæ āā ℈i.
M. f. massa in pilulas xii dividenda. (One pill to be taken three times a-day, in the same cases as 38. The dose is for an adult.)

ON THE MUCOUS MEMBRANES.

Preparations of the London Pharmacopœia.

Copaiba	Dose ♏xx to ʒi or more.
Cubebæ	„ ℈i to ʒii or more.
Tinctura cubebæ	„ fʒi to fʒii or more.
Confectio piperis (nigri)	„ ʒi to ʒii.
Balsamum tolutanum	„ ʒss to ʒi.
Syrupus balsami tolutani	„ ʒii to ℥ss or more.
Tinctura benzoini composita	„ ʒss to ʒii.
Oleum terebinthinæ purificatum	„ ♏x to ʒss.

In the form of Mixture, Draught, &c.

41. ℞. Copaibæ f℥ss.
Liq. potassæ fʒi.
Decoct. hordei C. f℥vss.
M. f. mistura. (A sixth part for a dose three times a-day in gonorrhœa; also in bronchitis.)

42. ℞. Cubebæ ℥ii.
Syrupi papaveris f℥i.
Pulv. acaciæ ℥ss.
Aquæ cinnamomi f℥vii.
M. (Dose, a table-spoonful; in gonorrhœa and gleet.)

43. ℞. Cubebæ ℥ss.
Confect. sennæ ʒii.
Syrupi simp. q. s.
M. f. electuarium. (To be taken at the beginning of an attack of gonorrhœa, which, if retained on the stomach, it sometimes cuts short.)

44. ℞. Confectionis piperis.
———— cassiæ āā ℥i.
M. f. confectio. (Dose, a dessert-spoonful, increased to a table-spoonful twice or thrice a-day; for hæmorrhoids.)

45. ℞. Tinct. Benzoini C. f℥ss.
Syrupi tolutani f℥ii.
Acaciæ pulv. ℥ss.
Pulv. tragacanth ʒi.
Aquæ cinnam. f℥i.
Aquæ f℥ii ss.
M. (A fourth part three times a-day; in bronchitis.)

46. ℞. Olei terebinth. pur. ʒii.
Mellis ℥iv.
Pulv. glycirrh. q. s.
Ut fiat electuarium. (A table-spoonful three or four times a-day; in chronic bronchitis.)

In the form of Pill or Powder.

47. ℞. Copaibæ.
Magnesiæ āā ℥i.
M. et divide in pilulas cc. (Six to twelve pills four times a-day; in gonorrhœa and bronchitis.)

48. ℞. Cubebæ.
Sodæ carb. āā ℥i.
M. f. pulv. viii. (One to be taken three or four times in the day; in gonorrhœa.)

(Copaiba may be administered both for gonorrhœa and bronchitis in the form of capsule, enclosed in a thin layer of gelatine. Turpentine and iodine may be inhaled as a stimulant to the mucous membrane of the bronchial tubes. A drachm of turpentine, or half a drachm of tincture of iodine to half a pint of hot water, is a suitable quantity.)

3. EXTERNAL AND LOCAL STIMULANTS.

RUBEFACIENTS (Vesicants, Epispastics, Stimulating Embrocations, Plasters, Ointments, &c.).

Preparations of the London Pharmacopœia.

1. Acidum aceticum; hydrochloricum; nitricum; sulphuricum.
2. Alcohol.
3. Allium sativum.
4. Liquor ammoniæ; liquor ammoniæ fortior; linimentum ammoniæ; ammoniæ sesquicarbonas; liquor ammoniæ sesquicarbonatis; linimentum ammoniæ sesquicarbonatis.
5. Antimonii chloridum; antimonii potassio-tartras; unguentum antimonii potassio-tartratis.
6. Argenti nitras; liquor argenti nitratis; (ʒi.—ʒi.)
7. Armoraciæ radix.
8. Acidum arseniosum.
9. Barii chloridum.
10. Cajuputi oleum.
11. Calx chlorinata.
12. Linimentum calcis.
13. Potassa cum calce.
14. Camphora; tinctura camphoræ; linimentum camphoræ; linimentum camphoræ compositum.
15. Cantharis vesicatoria; tinctura cantharidis; acetum cantharidis; ceratum cantharidis; unguentum cantharidis; emplastrum cantharidis.
16. Capsicum; tinctura capsici.
17. Cerevisiæ fermentum; cataplasma fermenti.
18. Chlorine vapour.
19. Creasotum; unguentum creasoti.
20. Croton oil (tiglii oleum).
21. Cupri sulphas; cupri ammonio-sulphas; cupri diacetas impura (ærugo); linimentum æruginis.
22. Elemi; unguentum elemi.
23. Ceratum hydrargyri compositum; linimentum hydrargyri; emplastrum hydrargyri; emplastrum ammoniaci cum hydrargyro; hydrargyri nitrico-oxydum; unguentum hydrargyri nitrico-oxydi; hydrargyri iodidum; unguentum hydrargyri iodidi; hydrargyri biniodidum; unguentum hydrargyri biniodidi; hydrargyri bichloridum; hydrargyri ammonio-chloridum; unguentum hydrargyri ammonio-chloridi; hydrargyri bisulphuretum; unguentum hydrargyri nitratis; unguentum hydrargyri nitratis mitius; hydrargyri bicyanidum.
24. Iodinium; unguentum iodinii compositum; sulphuris iodidum; unguentum sulphuris iodidi.
25. Phosphorus.

26. Pix abietina; emplastrum picis; unguentum picis; unguentum picis liquidæ; resina; ceratum resinæ.
27. Potassæ hydras (potassa fusa); potassii bromidum; potassii sulphuretum; emplastrum potassii iodidi.
28. Pyrethri radix.
29. Unguentum sabinæ.
30. Sinapis; cataplasma sinapis.
31. Liquor sodæ chlorinatæ.
32. Linimentum saponis.
33. Spiritus rectificatus; spiritus vini gallici (brandy).
34. Staphisagriæ semina.
35. Succini oleum.
36. Sulphur sublimatum; unguentum sulphuris; unguentum sulphuris compositum.
37. Terebinthina vulgaris; terebinthinæ oleum; linimentum terebinthinæ.
38. Zinci chloridum; zinci sulphas; unguentum zinci.
39. The essential oils.
40. Emplastrum ammoniaci, cumini, ferri, galbani.

Stimulants in the form of Lotion.

49. ℞. Acidi nitrici.
Acidi hydrochlor. āā ♏xx.
Aquæ f ℥viii. M.
(Lichen and chronic eczema.)

50. ℞. Rosæ petalorum ℈i.
Aquæ ferventis f ℥viii.
Acidi nitrici diluti f ʒiiss. M.
(In the same.)

51. ℞. Creasoti ♏iv.
Mist. acaciæ ℥i. M.
(In rheumatism.)

52. ℞. Acidi suphurici dil.
Aquæ destillatæ āā f ℥ss.
(In Porrigo favosa, applied with a camel's-hair brush.)

53. ℞. Potassæ fusæ ℈ii.
Aquæ destill. ℥iv.
(Porrigo favosa.)

54. R. Potassii sulphureti.
Saponis āā ʒii.
Spt. rectif. ℥i. M.
(In scabies and Porrigo favosa.)

55. ℞. Potassii sulphureti ℥iv.
Acidi sulphurici ℥ss.
Aquæ Oii. M.
(In Scabies; Dupuytren's lotion.)

56. ℞. Liq. ammon. fort. ℥i.
Spirit. rosmarini ℥ss.
Tinct. camphoræ ℥ii. M.
(A highly stimulant application where a rapid action on the skin is required. The acidum aceticum, or acetum cantharidis of the London Pharmacopœia, may be used with the same object.)

Stimulant Baths.

57. ℞. Acidi hydrochlorici ℥ii-℥iv.
Aquæ q. s.
(For a bath in certain chronic diseases of the skin.)

58. ℞. Acidi nitro-mur.* ℥ii—℥iv.
Aquæ tepidæ (96°) Cong. iv. *vel* q. s.
(A foot-bath in hepatic derangement. The mixed acids may be used in the proportion of ℥i to 8 gallons, as a bath for the whole body, or the surface may be sponged with it.)

59. ℞. Potass. carb. ℥iv.
Aquæ tepid. lb. ccc.
(An alkaline bath. The liquid may be sprinkled on bran, and applied to the skin in cutaneous diseases with low action.)

60. ℞. Sodæ carb. ℥iv — ℥viii.
Aquæ q. s.
(Another alkaline bath applicable in the same cases.)

Stimulants in the form of Liniment.

61. ℞. Liq. ammoniæ f ℥ss.
Liniment. saponis f ℥iss. M.

62. ℞. Tinct. cantharidis f ℥ss.
Liniment. saponis f ℥iss.
(A good application to chilblains.)

63. ℞. Camphoræ ʒiss.
Olei terebinth. f ℥iss. M.

64. ℞. Tinct. cantharidis f ℥i.
Olei terebinth. f ℥ss.
Lin. camphoræ f ℥ss. M.

65. ℞. Pulv. sem. sinapis ℥i.
Acidi acetici f ℥ss.
Lin. saponis c. f ℥iss. M.

66. ℞. Camphoræ ʒss.
Olei olivæ f ℥ii. M.

67. ℞. Olei succini f ʒii.
Lin. saponis comp. f ʒx. M.
(Similar to Roche's royal embrocation. A tea-spoonful to be rubbed into the back in hooping-cough, &c.)

68. ℞. Antim. pot. tart. ℈ii.
Aquæ rosæ f ℥ii.
Dissolve, then add—
Tinct. cantharidis f ℥i. M.

69. ℞. Acidi sulphurici ʒiss.
Olei terebinthinæ ℥ss.
Olei olivæ ℥iss. M.
(Known as Pearson's liniment.)

70. ℞. Olei cajuputi f ℥iss.
Liq. ammon. sesquicarb. f ℥ss. M.

Stimulating Ointments.

71. ℞. Argent. nit. gr. x.
Ung. cetacei ʒi. M.

72. ℞. Olei tiglii ♏x.
Adipis ℥ss. M.

(As a counter-irritant in internal inflammations till an eruption appears on the skin. A piece the size of a nut to be rubbed in three times a-day.)

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* One part nitric to two parts muriatic acid.

73. ℞. Creasoti ♏v—xxx.
Adipis ℥ss. M.
(In acne, sycosis, lepra, psoriasis, ozœna, and ill-conditioned ulcers.)

74. ℞. Sodæ carb. ʒii.
Calcis ʒi.
Adipis ℥i. M.
(Porrigo favosa.)

75. ℞. Potassæ carb. ℥i.
Sulphur. precip. ℥ii.
Adipis ℥iv.
M. fiat unguentum. (Helmerich's ointment, applied every night in scabies.)

76. ℞. Picis liquidæ ℥iv.
Ceræ flavæ ℥ss.
Sulphuris ℥i. M.
(In porrigo, impetigo, &c.)

77. ℞. Antim. pot. tart. ʒi.
Adipis ℥i. M.
(In spinal irritation.)

78. ℞. Potassæ carb. ʒi.
Adipis ℥i. M.
(In pustular diseases of the skin.)

Stimulating Poultices, &c.

79. ℞. Sinapis lb. ss.
Aceti calidi q. s. M.
(A more stimulating application than the cataplasma sinapis of the Pharmacopœia.)

80. ℞. Lini seminis contriti ℥iv.
Aquæ ferventis f ℥viii.
Mix gradually, and add—
Calcis chlorinatæ ʒii.
(Similar to the cataplasma sodæ chlorinatæ of the Pharmacopœia.)

Stimulating Gargles.

81. ℞. Tinct. capsici ℥ss—℥i.
Syrupi simp. ℥i.
Aquæ rosæ ℥vi.

82. ℞. Vini rubri Lusitan. ℥vi.
Extracti cinchonæ ʒi.
Tinct. capsici ℥ss. M.

83. ℞. Acidi hydrochlorici f ℥ss.
Mellis rosæ ℥i.
Aquæ hordei f ℥viss. M.

84. ℞. Acidi nit. f ʒi.
Acidi hydrochl. f ʒii.
Aquæ hordei f ℥viss.
Mellis rosæ f ℥i. M.
(To be used several times in the day, in relaxed sore throat.)

85. ℞. Infus. rosæ c. ℥iiiss.
Tinct. myrrhæ ℥ss.
Sacchari pur. ℥ss. M.

86. ℞. Boracis ℥ss.
Mellis rosæ ℥i.
Aquæ ℥viss.

87. ℞. Mist. acaciæ ℥viiss.
Olei terebinth. ℥ss. M.
(In ptyalism.)

88. ℞. Liq. sodæ chlorinatæ f ℥ss.
Mellis ℥i.
Aquæ rosæ ℥iiss. M.
(A table-spoonful to be mixed with a glass of warm brandy and water, and used frequently as a gargle.)

Stimulating Enemata.

89. ℞. Liq. sodæ chlorinatæ ℥ss.
Decocti hordei ℥x. M.

90. ℞. Olei terebinth. f ℥i.
Pulv. acaciæ q. s.
Mix and add—
Decocti hordei f ℥xix.
(In distension of the abdomen with gas.)

91. ℞. Infusi fœniculi f ℥xiss.
Tinct. assafœtidæ f ℥ss. M.

92. ℞. Olei terebinth.
Tinct. assafœtidæ āā ℥ss.
Decocti hordei Oi. M.
Applicable for the same purpose as F. 90, especially in hysterical cases.

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4. EXTERNAL STIMULANTS CONTAINING PREPARATIONS OF MERCURY, ARSENIC, IODINE, PHOSPHORUS, &c.

93. ℞. Camphoræ ℈i.
Unguenti hyd. fortior. ℥ss.
M. fiat unguentum.

94. ℞. Linimenti hydrargyri f ℥ss.
Olei terebinth. rect. f ℥ss.
Linimenti camphoræ f ℥i.
M. fiat linimentum.

95. ℞. Hydrarg. chloridi ʒi.
Adipis ℥i. M.
(In chronic skin diseases.)

96. ℞. Unguent. hydrarg. fort.
Cerati saponis āā ℥i.
Camphoræ ʒi. M.
(Known as Scott's ointment.)

97. ℞. Hydrarg. bichloridi gr. i.
Aquæ destill. f ℥viii.
M. f. collyrium.

98. ℞. Hydrargyri biniodidi gr. x.
Adipis ℥i.
M. fiat unguentum. (In syphilitic eruptions and inveterate scaly diseases.)

99. ℞. Hydrargyri iodidi ℈i.
Adipis ℥i.
M. fiat unguentum.

100. ℞. Hydrarg. bichloridi gr. x.
Liq. calcis ℥vi.
M. f. lotio. (The yellow wash.)

101. ℞. Hyd. chloridi ʒi.
Mucil. acaciæ f ℥ss.
Liq. calcis ℥vss.
M. f. lotio. (The black wash.)

102. ℞. Arsenici iodidi gr. iii.
Adipis ℥i.
M. fiat unguentum. (In cancerous diseases, lupus, &c.; must be used with great caution.)

103. ℞. Acidi arseniosi gr. viii—gr. x.
Hydrarg. chloridi ℥i.
(Dupuytren's powder in lupus.)

104. ℞. Acidi arseniosi gr. x.
Hydrarg. sulphuret ℈ii.
Carbonis animalis gr. x. M.
(Côme's powder in lupus.)

105. ℞. Liq. pot. arsenitis f ʒi—ʒii.
Aquæ destillatæ f ℥i.
M. f. lotio. (In mild cases of the same.)

106. ℞. Hyd. chlorid. gr. cc.
Arsenici. oxid. alb. gr. i.
M. f. pulvis. (In lupus, to be sprinkled over a small portion of diseased surface by means of a puff.—*Dupuytren.*)

107. ℞. Potassii iodidi gr. vi.
Iodinii gr. iii.
Aquæ destill. lb. i.
Solve: fiat collyrium. (Scrofulous inflammation of the eye.)

108. ℞. Potassii iodidi ʒss.
Adipis ℥i.
M. f. unguentum. (Scrofulous ulcers, papular diseases of the skin and scabies.)

109. ℞. Sulphuris iodidi ℈i.
Adipis ℥ss.
M. fiat unguentum. (In a variety of cutaneous diseases.)

110. ℞. Ung. iodinii c ℥ss.
Adipis ℥v.
M. f. unguentum. (In scabies.)

111. ℞. Zinci iodidi ʒi.
Adipis ℥i.
M. f. unguentum.

112. ℞. Barii iodidi gr. iv.
Adipis ℥i.
M. fiat unguentum. (Scrofulous tumours; requiring to be used with caution.)

113. ℞. Phosphorus gr. ii—v.
Ætheris q. s.
Dissolve the phosphorus in the ether, then add—
Camphoræ ℈i.
Cerati albi ℥ss.
M. f. unguent. (Lupus, syphilitic tubercle, acne rosacea.)

Sulphur and Iodine Fumigation.

114. ℞. Sulphuris ℥ss—℥iss.
Iodinii ℈i—℈iii.
M. fiat pulvis. (A twelfth part to be used at a time.)

115. ℞. Manganesii binoxidi ℥i.
Sodii chloridi ℥iii.
Mix well, then add—
Acidi sulph. ℥i.
Aquæ ℥ii.
(The chlorine given off from this mixture on the application of heat, forms a powerful stimulant in certain cases of cutaneous disease and in chronic rheumatism, &c. The vapour must be so applied to the surface that it may not reach the lungs. The vapours of sulphur applied with the same precaution are of great service in obstinate forms of skin disease.)

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5. NARCOTICS, ANODYNES, AND SEDATIVES.

(Including Antispasmodics belonging to these Classes.)

Preparations of the London Pharmacopœia.

1. Acidum hydrocyanicum dilutum, dose ♏ii—♏v, cautiously increased.
2. Aconiti (folia et radix), dose of leaves, gr. i—gr. ii, cautiously increased.
   Aconiti extractum, dose gr. i—gr. ii, gradually increased.

Aconiti tinctura, dose ♏iii—♏v, cautiously increased.

Aconitina (only used externally).

3. Amygdalæ amaræ oleum, dose ♏¼—♏i.

4. Belladonnæ folia, dose gr. i, gradually increased to gr. v.

———— extractum, dose gr. ¼—gr. i, gradually increased.

———— tinctura, ♏v—♏x.

5. Conii (folia et fructus), dose gr. iii—gr. v.

—— extractum, dose gr. iii—gr. v.

—— tinctura, dose f ʒss—f ʒi.

—— pilulæ compositæ, dose gr. v.

6. Digitalis (folia et semina), dose gr. i—gr. iii.

——— infusum, dose f ℥ss—f ℥i.

——— tinctura, dose ♏x increased to ♏xx.

——— extractum, dose gr. ½—gr. i.

7. Hyoscyami (folia et semina), dose gr. v—gr. x.

———— extractum, dose gr. v—℈i.

———— tinctura, dose ♏x—f ʒi.

8. Lactucæ extractum, dose gr. v—℈i.

9. Lobeliæ inflatæ pulvis, dose gr. i—gr. v.

——— tinctura, ♏x—f ʒi.

——— tinctura ætherea, ♏x—f ʒi.

10. Morphia, dose gr. ¼—gr. i.

Morphiæ hydrochloras, dose gr. ¼—gr. ½.

Liquor morphiæ hydrochloratis, ♏v—♏xx.

Morphiæ acetas, dose gr. ⅛—gr. ¼.

Liquor morphiæ acetatis, ♏v—♏xx.

11. Opium, dose gr. i—gr. ii.

Opii extractum, dose gr. ½—gr. iii.

Pilulæ saponis C. (gr. i in gr. v), dose gr. v—gr. x.

—— styracis C. (gr. i in gr. v.), dose gr. v—gr. x.

Pulvis cretæ C. c opio (gr. i in ℈ii), dose gr. x—℈ii.

——— kino C. (gr. i in ℈i), dose gr. x—℈i.

——— ipecacuanhæ C. (gr. i in gr. x), dose gr. x.

Confectio opii (gr. i in gr. xxx), dose gr. x—ʒi.

Tinctura opii (gr. i in ♏xiii), dose ♏x—f ʒss.

Vinum opii (gr. i in ♏xvi), dose ♏x—f ʒss.

Tinctura camphoræ C. (less than gr. i in f ℥ss), dose f ʒss—f ℥ss.

Enema opii (f ʒss of laudanum to starch f ℥iv).

12. Papaveris syrupus, dose, children f ʒi—f ʒii; infants ♏x—♏xx.

——— extractum, dose gr. ii—gr. x.

13. Stramonii (folia et semina), dose gr. i—gr. v.

———— extractum, dose gr. ¼—gr. iii.

14. Tabaci enema (tobacco ℈i—boiling water Oss).

15. Veratri vinum, dose ♏x.

Veratria, dose gr. 1/12.

Cannabis indica, Indian hemp, dose of the extract, gr. $\frac{1}{2}$—gr. ii, or more; dose of the tincture (extract ℥ss, *rectified* spirit f℥x) ♏x—fʒi, or more.
Æther and chloroform in form of vapour, dose ♏xx—ʒi.
Chloric æther, dose ♏x—♏xx.
Liquor opii sedativus (two drops equal to three of laudanum).
Black drop (one drop equal to three of laudanum).

Narcotics, &c., in the form of Mixture and Draught.

116. ℞. Tinct. opii ♏xx.
Aquæ cinnam.
Aquæ puræ āā ʒvi.
M. fiat haustus. (To be taken at bed-time.)

117. ℞. Potassæ carb. ℈i.
Aq. menthæ virid. ℥i.
Tinct. opii ♏xxv.
Syrupi tolut. ʒi.
M. fiat haustus. (To be taken at bed-time, with a table-spoonful of lemon juice.)

118. ℞. Tinct. opii ♏xxx.
Liq. ammon. acet.
Aq. cinnam.
Syrupi tolutani, āā f℥ss.
M. fiat haustus. (To be taken at bed-time, or on the return of pain.)

119. ℞. Morphiæ acetatis gr. i.
Aquæ destill. ℥i. M.
(A tea-spoonful at bed-time, or on the return of pain.)

120. ℞. Acidi sulph. dil.
Tinct. hyoscyami āā ʒiiss.
Tinct. digitalis ʒi.
Liq. ammon. acet.
Aquæ āā ℥iv.
M. fiat mistura. (Two table-spoonfuls three times a-day in hyperlactatio and states of system called "nervous.")

121. ℞. Acidi hydrocyan. dil. ♏xx.
Mist. amygdal. ℥vi.
M. fiat mistura. (A sixth part three times a-day. In irritable stomach, gastralgia, palpitations, angina pectoris, spasmodic affections of the muscles of respiration, &c.)

122. ℞. Bismuthi nitratis gr. x.
Acidi hydrocyan. dil. ♏v.
Mist. acaciæ ℥i.
Syrupi aurantii ʒi.
M. fiat haustus. (In gastralgia.)

123. ℞. Acidi hydrocyan. dil. ♏xx.
Tinct. digitalis ʒi.
Mist. camphoræ.
Aquæ cinnam. āā ℥iii.
M. f. Mist. (A sixth part for a dose.)

124. ℞. Tinct. opii ♏v.
Mist. acaciæ.
Syrup. simp. āā ℥ss.
Aquæ destill. ℥i.
M. fiat mistura. (To procure sleep in very young children: dose, a tea-spoonful for a child of one month, repeated every half hour till sleep is procured. Each tea-spoonful will contain about gr. $\frac{1}{40}$ of opium.)

125. ℞. Ext. belladonnæ gr. ii.
Aquæ destill. ℥i. M.
(♏v—x three times a-day. As a prophylactic in scarlatina.)

126. ℞. Mist. cretæ f ℥vi.
Conf. arom. ʒii.
Tinct. opii ♏xl.
Aquæ cinnam. f ℥ii.
M. fiat mistura. (Two table-spoonfuls after each liquid motion.)

127. ℞. Potassæ nitratis ʒi.
Tinct. digitalis f ʒi.
Liq. ammon. acet. f ℥iiss.
Aquæ destillatæ f ℥iii.
Syrupi croci f ℥ss.
M. fiat mistura. (A sixth part for a dose.)

128. ℞. Potassæ nitratis ʒi.
Syrupi papaveris f ℥i.
Mist. amygdalæ f ℥v. M.
(A dessert-spoonful when the cough is troublesome.)

129. ℞. Ætheris chlorici ♏x.
Liq. ammon. citrat. f ℥ss.
Syrupi limonum f ʒii.
Aquæ destill. f ʒvi.
M. f. haustus. (To be taken three times a-day in troublesome coughs.)

Narcotics, &c., in the form of Pill or Powder.

130. ℞. Extracti opii gr. ½.
——— papaveris gr. iv.
M. f. pilula. h. s. s.

131. ℞. Pulv. ipecac. comp. gr. i.
Sacchari. ℈i.
M. fiat pulvis. Divide into four powders. (For young infants.)

132. ℞. Camphoræ gr. iii.
Spirit. vin. rect. ♏ii.
Ext. lactucæ gr. v. M.
(Divide into two pills, to be taken at bed-time.)

133. ℞. Ext. belladonnæ gr. iv.
Extracti conii.
Pulv. ipecac. c. āā ℈i. M.
(Divide into sixteen pills, one to be given every four or six hours. In pertussis and scarlatina.)

134. ℞. Pulv. digitalis.
—— scillæ.
Ext. hyoscyami āā ℈i. M.
Divide into twelve pills. (In bronchitis, asthma, &c.)

135. ℞. Camphoræ pulv. gr. iii.
Extracti hyoscyami gr. ii.
M. fiat pilula.

136. ℞. Extracti hyoscy. gr. ii—v.
Extracti conii gr. iii.
M. f. pilula.

137. ℞. Extracti conii ʒss.
Pulv. fol. conii ℈i. M.
(Divide into twelve pills, one to be taken three or four times a-day. In cancer and other painful affections where opium disagrees.)

138. ℞. Extract. conii.
Pulv. ipecac. comp. āā ℈i.
Mucil. acac. q. s. M.
Divide into ten pills.)

139. ℞. Ext. stramonii gr. i.
Ext. glycirrh. ʒi. M.
(To be made into six pills. One to be taken occasionally as a lozenge when the cough is

troublesome. In cough, with irritation of the larynx or throat.)

140. ℞. Ext. aconiti gr. iii.
Ext. glycirrh. ℈i. M.
(Divide into six pills.)

6. EXTERNAL SEDATIVE APPLICATIONS.

Preparations of the London Pharmacopœia.

1. Atropiæ sulphas.
2. Cataplasma conii; unguentum conii.
3. Chloroformyl.
4. Decoctum dulcamaræ, papaveris, veratri.
5. Emplastrum belladonnæ, opii.
6. Extractum aconiti, belladonnæ, conii, digitalis, hyoscyami, lactucæ, opii, papaveris, stramonii.
7. Linimentum opii.
8. Unguentum gallæ C.; veratri; opii.

Several of the preparations of the Pharmacopœia already enumerated among narcotics and sedatives at p. 614 also admit of external application. All those substances, too, which produce cold by evaporation or otherwise, may be said to belong to the class of sedatives.

Sedative Lotions, &c.

141. ℞. Liq. ammon. acet.
Spirit. tenuioris
Aquæ, singulorum partes equales.
M. fiat lotio.

142. ℞. Opii ʒii.
Aquæ ferventis lb. i.
An opiate fomentation.

143. ℞. Conii fol. exsicc. ℥i.
Aquæ lb. iiss.
(Boil down to lb. ii, and use as a fomentation.)

144. ℞. Liq. potassæ ʒii.
Acidi hydrocyanici dil. ℥i.
Mist. amygdal. ℥vii.
M. f. lotio. (In prurigo.)

145. ℞. Liq. plumbi diacetat. f ʒi.
Acidi acetici dil.
Spiritus rectif. āā f ℥ss.
Aquæ ℥xi.
M. fiat lotio.

146. ℞. Ammon. hydrochloratis ℥i.
Spt. rectif. f ℥i.
Aquæ f ℥xv.
M. f. lotio.

147. ℞. Potassii cyanidi gr. x.
Mist. amygdalæ ℥vi.
(In chronic eruptions with itching.)

148. ℞. Acidi hydrocyanici dil.
Spiritus rectif. āā f ʒss.
Aquæ f ℥vii.
M. f. lotio. (In impetigo, and itching eruptions generally.)

149. ℞. Acidi hydrocyanici dil.
Spiritus rectif. āā f ℥ss.
Plumbi diacetatis ℈i.
Aquæ f ℥viii.
M. f. lotio. (The same.)

150. ℞. Plumbi diacetatis ℈i.
Vini opii f ʒi.
Aquæ rosæ f ℥viii.
M. f. lotio. (In eczema.)

151. ℞. Sodii chloridi.
Potassæ nitratis.
Ammoniæ hydrochloratis
āā ℥ii.
Mix, and dissolve in water. (A frigorific mixture, applicable whenever intense cold is required.)

Sedative Ointments, Liniments, &c.

152. ℞. Plumbi acetatis ʒss.
Acidi hydrocyanici dil. ʒiii.
Unguent. cetacei ℥iii. M.
(In cases of eczema, &c.)

153. ℞. Potassii cyanidi gr. xii.
Ol. amygdal. ʒii.
Ung. ceræ alb. ℥ii. M.
(In lichen and prurigo.)

154. ℞. Aconitinæ gr. ii—iv.
Alcohol ♏iv.
Adipis ℥ss.
M. optime: f. unguentum.

155. ℞. Ext. belladonnæ ʒii.
Aquæ calcis ℥viii.
Ol. amygdal. ℥iv.
M. fiat linimentum. (To be applied with a feather in acute eczema and impetigo.)

156. ℞. Veratriæ gr. iv.
Alcohol ♏vi.
Adipis ℥ss.
M. bene: fiat unguentum. (In neuralgia.)

157. ℞. Ext. belladonnæ ʒii.
Cerat. cetacei ℥i.
M. f. unguentum.

Sedative Enemata, &c.

The Enema Opii and Enema Tabaci of the London Pharmacopœia.

158. ℞. Camphoræ ʒi.
Olei olivæ f ℥ii. M.
(In the irritation of worms.)

159. ℞. Fol. belladonnæ gr. xii.
Aq. fervent. ℥vi.
Fiat injectio. (In spasmodic contraction of the urethra.)

160. ℞. Opii gr. ii.
Saponis duri. gr. iii.
M. fiat suppositorium. (To procure sleep or allay irritation in the rectum, bladder, or uterus.)

161. ℞. Tinct. opii ♏xl.
Decoct. amyli. ℥iv.
M. fiat enema.

7. STIMULANTS, IN COMBINATION WITH NARCOTICS, SEDATIVES, AND ANODYNES.

(Including Stimulant and Anodyne Antispasmodics.)

[For the preparations of the London Pharmacopœia belonging to these two classes, see pp. 602 and 614.]

In the form of Mixture or Draught.

162. ℞. Tinct. valerianæ ammon. ʒss.
Spirit. æther. comp. ʒi.
Tinct. hyoscyami ʒss.
Mist. camphoræ ℥i.
M. fiat haustus. (In hysteria.)

163. ℞. Ammon. sesquicarb. gr. x.
Succi limonis recentis q. s.
Mist. camph. f ʒx.
Syrupi aurantii f. ʒii.
Tinct. opii ♏x—xxx.
M. fiat haustus.

164. ℞. Moschi gr. x.
Ætheris.
Tinct. opii āā ♏xx.
Aq. cinnam. ℥i.
M. f. haustus. (Last stage of typhus.)

165. ℞. Mist. camphoræ ʒvi.
Liq. ammon. acet. ʒiii.
Spirit. æther. c.
Tinct. camphor. c.
Syrupi papav. āā ʒi.
M. f. haustus.

166. ℞. Liq. opii sedativ. ♏x.
Mist camph. ℥i.
M. fiat haustus.

167. ℞. Tinct. opii f ʒi.
Spirit. æther. comp.
Syrupi rhœados āā f ℥ss.
Mist. camph. f ℥v. M.
(A fourth part for a dose.)

168. ℞. Mist. camphoræ ℥v.
Spirit. æther. c. ʒii.
Tinct. opii ʒss.
Pulv. moschi ʒss.
Spirit. ammon. aromat. ʒi.
M. fiat mistura. (A fourth part for a dose.)

169. ℞. Tinct. opii f ʒss.
Mist. camphoræ f ʒxiv.
Syrupi tolutani f ʒi.
M. fiat haustus.

170. ℞. Spirit. æther. c. ʒii.
Tinct. opii ♏xxx.
Tinct. valerianæ ammon. ℥ss.
Spirit. cinnamomi ℥i.
Aquæ anethi ℥ivss.
M. fiat mistura. (A fourth part for a dose. Gastralgia, flatulence, &c.)

In the form of Pill or Powder.

171. ℞. Camphoræ.
Moschi.
Assafœtidæ sing. gr. iii.
Opii. gr. i.
Syrupi zingib. q. s.
Divide into two pills. (To be taken every three or four hours. In hysteria.)

172. ℞. Castorei ℈i.
Ammon. carb. gr. v.
Pulv. opii gr. ½.
Syrup. q. s.
Divide into six pills. (To be taken at short intervals in hysteria.)

173. ℞. Camphoræ gr. viii.
Moschi gr. vi.
Pulveris opii gr. ii.
M. F. pulvis.

174. ℞. Pil. saponis comp. gr. iii.
Pulveris capsici gr. iii.
Olei fœniculi ♏ii.
(Divide into two pills.)

175. ℞. Camphor. gr. iv.
Ammon. sesquicarb. gr. iii.
Ext. hyoscyami gr. iv.
Mucil. q. s.
(Divide into three pills.)

8. EXTERNAL APPLICATIONS (Stimulant and Sedative).

176. ℞. Lin. saponis comp. f ℥iss.
Tinct. opii f ℥ss.
M. fiat embrocatio.

177. ℞. Tinct. cantharidis f ℥ss.
Linimenti camphoræ f ℥i.
Liq. ammon. carbon. f ʒi.
Tinct. opii f ʒiii.
M. fiat embrocatio.

178. ℞. Olei cajuputi f ℥iss.
Tinct. opii f ℥ss.
M. fiat linimentum.

179. ℞. Extract. conii ℥ii.
Olei anisi f ʒss.
M. fiat emplastrum.

180. ℞. Olei tiglii ♏x.
Lin. saponis f ℥i.
Tinct. opii f ℥ss.
M. f. linimentum.

181. ℞. Gallæ pulveris ʒi.
Camphoræ ʒss.
Tinct. opii f ʒii.
Cerati ℥j.
M. fiat unguentum.

ENEMATA (Stimulant and Sedative).

182. ℞. Tinct. assafœtidæ f ℥ss.
Tinct. opii f ʒi.
Decoct. hordei Oss.
M. fiat enema. (In flatulent colic, tympanites, &c)

183. ℞. Camphoræ ℈i.
Olei terebinth. f ℥i.
Ol. olivæ ℥iss.
Spirit. ammon. fœt. ℥ss.
M. fiat enema. (In the same.)

TONICS.

Preparations of the London Pharmacopœia, with their Doses.

Mineral Acids.

1. Acidum sulphuricum dilutum - - - - dose ♏ x to ♏ xxx.
2. Acidum nitricum dilutum - - - - - - - „ ♏ x — ♏ xxx.
3. Acidum hydrochloricum dilutum - - - „ ♏ x — ♏ xxx.

Preparations of Iron.

4. Ferri ammonio-chloridum - - - - - - - dose gr. iii to gr. x.
5. Ferri ammonio-citras - - - - - - - - - - gr. v — gr. x.
6. Ferri carbonas c. saccharo - - - - - - - gr. x — ʒ ss.
7. Ferri potassio-tartras - - - - - - - - - - gr. x — ʒ ss.
8. Ferri sesquioxydum - - - - - - - - - - ℈ i — ℥ ss.
9. Ferri sulphas (dried) - - - - - - - - - - gr. v — gr. x.
10. Mistura ferri composita - - - - - - - - f ℥ i — f ℥ ii.
11. Pilulæ ferri compositæ - - - - - - - - - gr. v — gr. x.
12. Tinctura ferri sesquichloridi - - - - - - ♏ x — f ʒ i.
13. Tinctura ferri ammonio-chloridi - - - m x — f ʒ ss.

The citrate, and ammonio-tartrate of iron, in doses of from gr. v to gr. x; the syrup of the citrate and of the iodide of iron, in doses of from f ʒ ss to f ʒ i; the mixed citrate of iron and quinine (dose from gr. iii to gr. v, or more); and the syrup of the citrate of iron and quinine (dose from f ʒ ss to f ʒ i)—are elegant forms of chalybeate preparations in common use.

Preparations of Zinc.

14. Zinci oxydum - - - - - - - - - - dose gr. ii to gr. v, or more.
15. Zinci sulphas - - - - - - - - - - „ gr. ii — gr. v, or more.

The valerianate of zinc (dose gr. v) is a very elegant preparation of this metal.

Preparations of Copper.

16. Cupri sulphas - - - - - - - - - - dose gr. ¼ to gr. ii.
17. Cupri ammonio-sulphas - - - - „ gr. ½ — gr. iii, or more.
18. Liquor cupri ammonio-sulphatis - „ f ʒ i — f ʒ ii.

Preparations of Arsenic.

19. Liquor potassæ arsenitis (gr. iv in f ℥ i) dose ♏ iii to ♏ v, gradually increased.
20. Liquor arsenici chloridi (gr. i½ in f ℥ i) „ ♏ v — ♏ x, gradually increased.

Preparations of Silver.

21. Argenti oxydum - - - - - - - - dose gr. ½ to gr. i.
22. Argenti nitras - - - - - - - - - - „ gr. ¼ — gr. i, gradually increased.

23. Bismuthi nitras - - - - - - - - - dose gr. v to ℈ i.

Preparations of Bark.

24. Decoctum cinchonæ - - - - - - -	dose	f ℥ i	to f ℥ ii.
25. Extractum cinchonæ - - - - - -	„	℈ i	— ʒ i.
26. Infusum cinchonæ - - - - - - -	„	f ℥ i	— f ℥ ii.
27. Infusum cinchonæ spissatum - -	„	f ℥ i	— f ℥ ii.
28. Tinctura cinchonæ - - - - - - -	„	f ʒ i	— f ʒ ii.
29. ——————— composita - -	„	f ʒ i	— f ʒ ii.
30. Quinæ disulphas - - - - - - - -	„	gr. i	— gr. v.

31. Aqua anethi, carui, cinnamomi, menthæ (viridis and piperitæ) pulegii, and pimentæ.
32. Balsamum Peruvianum and Tolutanum.
33. Confectio aromatica, aurantii, cassiæ, piperis, and rutæ.
34. Decoctum pareiræ, senegæ, tormentillæ, ulmi, and uvæ ursi.
35. Extractum gentianæ, glycyrrhizæ, hæmatoxyli, lupuli, pareiræ, sarsæ liquidum, buchu, taraxaci, and uvæ ursi.
36. Infusum anthemidis, armoraciæ comp., aurantii comp., calumbæ, caryophylli, cascarillæ, cuspariæ, gentianæ comp., krameriæ, lupuli, quassiæ, rosæ comp., serpentariæ, and valerianæ.
37. Mistura cascarillæ comp., gentianæ comp., guaiaci.
38. Pilulæ galbani comp.
39. Pulvis cinnamomi comp.
40. Syrupus aurantii, cocci, croci, limonum, mori, rhamni, rhæados, rosæ, sarsæ, tolutanus, violæ, and zingiberis.

(The tonic tinctures, wines, spirits, and essential oils are given under the head of Stimulants.) Battley's liquor cinchonæ cordifoliæ (dose ♏ v to ʒ ss) is an elegant tonic preparation.

Tonics in the form of Mixture or Draught.

184. ℞. Decocti cinchonæ f ℥vi.
Acidi sulph. dil f ʒiss. M.
(A sixth part for a dose.)

185. ℞. Decocti cinchonæ f ℥vss.
Extract. cinchonæ ʒss.
Tinct. cinchonæ comp. f ℥ss. M.
(A sixth part for a dose.)

186. ℞. Acidi hydrochlor. dil. f ʒii.
Infusi calumbæ ℥vss
Tinct. lupuli f ℥ss. M.
(A sixth part for a dose.)

187. ℞. Acidi hydrochlorici ʒi.
Aquæ Oj.
Sacchari q. s. M.
(To be used as a common drink.)

188. ℞. Decocti senegæ f ℥viss.
Mist. acaciæ f ℥ss.
Syrupi tolut. f ℥i. M.
(Three or four table-spoonfuls for a dose. In bronchitis with excessive secretion and great debility; in bronchitis senilis.)

189. ℞. Quinæ disulphatis gr. xii.
Tinct. aurantii f ℥i.
Infus. rosæ C. f ℥v. M.
(A sixth part for a dose.)

190. ℞. Liq. potassæ arsenit. f ʒss.
Decoct. cinchon. f ℥v.
Syrupi aurantii f ℥i. M.
(A sixth part for a dose.)

191. ℞. Aq. menthæ piperitæ ℥vss.
Syrupi aurantii ℥ss.
Acidi hydrochlorici.
—— nitrici āā ♏xii. M.
(A sixth part for a dose.)

192. ℞. Zinci sulphatis ℈i.
Infus. quassiæ f ℥v.
Tinct. calumbæ f ℥i. M.
(A sixth part for a dose.)

193. ℞. Zinci sulphatis ʒss.
Decocti cinchonæ f ℥vss.
Tinct. gentianæ f ℥ss. M.
(A sixth part for a dose.)

194. ℞. Magnesiæ ʒi.
Liquoris calcis f ℥vii.
Tinct. cardam. C. f ℥i. M.
(A sixth part for a dose.)

195. ℞. Ext. taraxaci ʒi.
Sodæ carb. ʒss.
Tinct. card. comp. f ℥ss.
Infus. calumbæ f ℥ii.
Aquæ pimentæ fʒiiiss. M.
(A sixth part for a dose, in chronic affections of the liver.)

196. ℞. Tinct. ferri sesquichloridi f ʒii.
Infus. quassiæ f ℥vi. M.
(A sixth part for a dose.)

197. ℞. Ferri sulph. ʒss.
Magnes. calcin. ʒi.
Infus. quassiæ ℥vi. M.
(A sixth part for a dose.)

198. ℞. Confectionis aromat. ʒi.
Spirit. æther. c. f ℥ss.
Mist. camphoræ ℥vii.
Syrupi zingiberis f ℥ss. M.
(Three table-spoonfuls for a dose.

Tonics in the form of Pill or Powder.

199. ℞. Sodæ carbonatis gr. v.
Pulv. cinchonæ ℈i.
M. f. pulvis.

200. ℞. Zinci oxydi.
Ext. gentianæ āā gr. v.
Fiant pilulæ duæ.

201. ℞. Zinci sulphatis gr. ii.
Ext. anthemidis gr. viii.
Fiant pilulæ duæ.

202. ℞. Cupri ammon. gr. ii.
Confectionis rosæ gr. iii.
M. f. pilula.

203. ℞. Cupri sulphatis gr. iii.
Pulv. opii gr. iii.
Confectionis rosæ ʒss.
M. ut fiant pilulæ xii. (One or two for a dose.)

204. ℞. Argenti nitratis gr. i.
Confectionis rosæ gr. v.
M. fiat pilula.
(To be taken twice a-day. In epilepsy.)

205. ℞. Ext. gentianæ ʒiii.
Fellis bovini ʒii.
Pulv. rhei ʒi.
Assafœtidæ ʒi.
M. et divide in pilulas c. (Two or three to be taken three times a-day.)

206. ℞. Ferri sulph. exsicc.
Ext. gentianæ āā ʒss.
M. f. massa in pil. xii divid. (In anæmia. One or two pills to be taken three times a-day.)

207. ℞. Quinæ disulphat. ℈i.
Extracti cinchonæ ℈ii.
M. f. massa in pilulas x dividenda. (One pill to be taken three times a-day.)

208. ℞. Argenti nitratis gr. ii.
Ext. lupuli ℈i.
—— hyoscyami gr. xii.
M. fiat massa in pilulas viii div. (One to be taken three times a-day.)

209. ℞. Ferri et quinæ citratis.
Ext. gentianæ āā ʒss.
M. f. massa in pilulas xii dividenda. (One or two pills three times a-day.)

9. ASTRINGENTS.

Preparations of the London Pharmacopœia.

1.	The mineral and vegetable acids.			
2.	Alumen	Dose	gr. x	to ʒ i.
3.	Alumen exsiccatum	„	gr. v	— gr. xv.
4.	Creta preparata—			
	Pulv. cretæ comp.	„	gr. v	— ʒ i.
	Mist. cretæ	„	f ℥ i	— f ℥ ii.
	Confectio aromatica	„	ʒ ss	— ʒ i.
5.	Plumbi acetas	„	gr. ii	— gr. x.
6.	The sulphates of iron, zinc, and copper.			
7.	Catechu pulvis	„	gr. x	— ʒ ss.
8.	Infusum catechu comp.	„	f ℥ i	— f ℥ ii.
9.	Tinctura catechu comp.	„	f ʒ i	— f ʒ ii.
10.	Tinctura kino	„	f ʒ i	— f ʒ ii.
11.	Granati pulvis	„	℈ i	— ʒ i.
12.	Granati decoctum	„	f ℥ i	— f ℥ ii.
13.	Granati radicis decoctum	„	f ℥ i	— f ℥ ii.
14.	Hæmatoxyli extractum	„	gr. x	— ʒ ss.
15.	Hæmatoxyli decoctum	„	f ℥ i	— f ℥ ii.
16.	Krameriæ pulvis	„	gr. x	— ʒ ss.
17.	Krameriæ infusum	„	f ℥ iss	— f ℥ ii.

(A tincture of krameria dose ♏ xx to f ʒ i is also in use.)

18.	Tormentillæ pulvis	Dose	ʒ ss	to ʒ i.
19.	Tormentillæ decoctum	„	f ℥ iss	— f ℥ ii.
20.	Infusum rosæ comp.	„	f ℥ i	— f ℥ ii.
21.	Confectio rosæ	„	ʒ i	— ʒ ii, or more.
22.	Mel rosæ; mel boracis	„	ʒ i	— ʒ ii.
23.	Quercûs pulvis	„	ʒ ss	— ʒ ii.
24.	Quercûs decoctum	„	f ℥ i	— f ℥ ii.
25.	Gallæ pulvis	„	gr. x	to ʒ ss.

26. Gallæ tinctura - - - - - - - Dose f ʒ ss to f ʒ ii.
27. Gallæ decoctum - - - - - - - „ f ℥i — f ℥ii.
28. Tannic and gallic acids - - - - - „ gr. v — gr. x.

(The tincture of matico [dose ♏ x to f ʒ i] is a valuable astringent remedy.)

Astringents in the form of Mixture or Draught.

210. ℞. Aluminis ʒi.
Infusi rosæ C. f ℥v.
Syrupi rhœados f ℥i. M.
(A sixth part for a dose.)

211. ℞. Mist. cretæ f ℥vii.
Syrupi papaveris f ℥i. M.
(Dose, two table-spoonfuls after every action of the bowels.)

212. ℞. Confectionis aromat. ʒii.
Pulv. ipecac. gr. x.
Mist. cretæ f ℥vi. M.
(A sixth part for a dose.)

213. ℞. Mist. cretæ f ℥v.
Spirit. myristicæ
Syrupi zingib. āā f ℥ss. M.
(A sixth part for a dose.)

214. ℞. Cort. querc. exter. cont. ℥iss.
Aquæ ferventis f ℥xx.
Macerate for three hours and strain, then add—
Pulveris gallæ ʒii.
Tinct. cardamomi comp. f ℥ii.
(A wine-glassful for a dose.)

215. ℞. Aluminis ʒss.
Acidi sulp. dil. f ʒii.
Infus. anthemidis f ℥vss.
Syrupi aurantii f ℥ss. M.
(A sixth part for a dose.)

216. ℞. Confect. aromat. ʒii.
Tinct. rhei f ℥i.
Syrupi croci f ℥i.
Aq. menthæ pip. f ℥iv. M.
(A sixth part for a dose.)

217. ℞. Zinci sulph. ℈i.
Aluminis ʒi.
Infus. rosæ C. f ℥v.
Syrupi rhœados f ℥i.
(A sixth part for a dose.)

218. ℞. Tinct. ferri sesquich. f ʒii.
Infusi quassiæ f ℥vi. M.
(A sixth part for a dose.)

219. ℞. Acidi sulph. diluti f ℥ss.
Infus. rosæ C. f ℥vi.
Syrupi rhœados f ℥ii.
Aquæ destill. f ℥xii.
(To be used as a common drink.)

220. ℞. Fol. uvæ ursi contus ℥ss.
Aquæ ferventis Oi.
Macerate for three hours, and strain. Take of this infusion f ℥vii. and add—
Tinct. kino.
Syrupi zingib. āā f ℥ss. M.
(A wine-glassful for a dose.)

221. ℞. Pulv. nucis vomicæ ʒi.
Aquæ f ℥viii.
Boil down to f ℥vi, and add—
Tincturæ opii f ʒi.
(Dose, one table-spoonful every two hours. In dysentery.)

222. ℞. Granati baccæ cort. ℥ss.
Lactis vaccini recent. lb.ii.
(Boil down to one-half, and give a wine-glassful every three hours, in chronic diarrhœa.)

223. ℞. Potassæ nitratis ℥ss.
Aceti.
Syrupi āā f ℥ii.
Aquæ destill. f ℥xii. M.
(To be used as a common drink.)

Astringents in the form of Pills and Powders.

224. ℞. Aluminis.
Pulv kino.
Pulv. zingib. āā gr. vi.
M. f. pulvis.

225. ℞. Plumbi acet.
Opii āā gr. vi.
Sacchari albi. ʒi. M.
Divide into twelve powders.
(One to be taken three or four times a-day.)

226. ℞. Cupri sulph.
Opii. āā gr. ss.
Confect. rosæ q. s.
Ut fiat pilula ter die sumenda.

227. ℞. Pulv. ipecac. gr. ii.
Alum gr. vi.
Syrupi papav. q. s. M.
Divide into two pills. (To be taken every four hours in dysentery.)

228. ℞. Zinci sulphat.
Ext. hæmatox. āā gr. v. M.
Divide into two pills.

229. ℞. Zinci sulphat.
Ferri sulphat.
Ext. gentianæ āā ℈i. M.
Divide into twelve pills. (Astringent tonic, one or two to be taken three times a-day.)

External Astringent Applications.

Preparations of the London Pharmacopœia.

1. The dilute mineral and vegetable acids.
2. Linimentum æruginis.
3. Alumen; alumen exsiccatum.
4. Argenti nitras.
5. Creta preparata.
6. Cupri sulphas.
7. Liquor aluminis comp.
8. Liquor calcis.
9. Liquor plumbi diacetatis.
10. Liquor plumbi diacetatis dilutus.
11. Ceratum plumbi acetatis.
12. Ceratum plumbi compositum.
13. Emplastrum plumbi.
14. Unguentum plumbi compositum.
15. Liquor sodæ chlorinatæ.
16. Unguentum gallæ comp.
17. Unguentum plumbi comp.
18. Unguentum zinci.
19. Ceratum calaminæ.

230. ℞. Zinci sulph. ʒi.
Aquæ rosæ.
Aquæ āā Oss.
M. fiat lotio.

231. ℞. Zinci sulph.
Aluminis āā ʒss.
Aquæ destil. Oi.
M. fiat injectio.

232. ℞. Aluminis ʒi.
Decocti quercûs Oi.
Fiat injectio.

233. ℞. Cretæ ℥i.
Olei olivæ ʒi.
Adipis ℥ss.
M. f. unguentum. (For burns and scalds.)

234. ℞. Liq. calcis ℥i.
Olei olivæ ℥ii.
Camphoræ ʒii.
M. fiat linimentum. (Superficial inflammations, burns, &c.)

235. ℞. Aluminis ʒi.
Acidi sulph. dil. f ʒss.
Tincturæ Myrrhæ f ʒii.
Decocti cinchonæ f ℥vi. M.
Fiat gargarisma.

236. ℞. Liq. plumbi diacet. f ʒi.
Acidi acetici.
Spirit. rectif. āā f ℥ss.
Aquæ f ℥ix.
M. f. lotio.

237. ℞. Liq. plumbi diacetat. ʒss.
Vin. opii ʒi.
Aquæ rosæ ℥viii.
M. fiat collyrium.

238. ℞. Aluminis gr. x—℈i.
Aquæ rosæ ℥iv.
M. fiat collyrium. (In chronic ophthalmia.)

239. ℞. Pulv. gallæ ʒi.
Opii pulv. ℈i.
Adipis ℥i.
M. f. unguentum. (Hæmorrhoids.)

240. ℞. Cort. gallarum ℥ss.
Aquæ ℥xviii.
Decoque ad ℥xvi. et fiat injectio. (In cases of leucorrhœa.)

241. ℞. Tannin ℈i.
Spirit. rectif. f ℥ss.
Mist Camphoræ f ℥vss. M.
Fiat gargarisma.

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10. DEPRESSANTS.

Preparations of the London Pharmacopœia.

1. Antimonii potassio-tartras - - -	Dose	gr. ⅙ to gr. ½ or more.
2. Vinum antimonii potassio-tartratis (gr. i in f ℥ss.) - - - -	,,	f ʒ ss — f ʒ ii.
3. Pulvis antimonii compositus - -	,,	gr. i — gr. ii.
4. Pulvis ipecacuanhæ - - - -	,,	gr. ii — gr. v.
5. Vinum ipecacuanhæ - - - -	,,	f ʒ ss — f ʒ i.
6. Acetum scillæ - - - - - - -	,,	f ʒ i — f ʒ ii.
7. Tinctura scillæ - - - - - -	,,	f ʒ ss — f ʒ i.
8. Acetum colchici - - - - - -	,,	♏ xx — f ʒ i.
9. Extractum colchici - - - -	,,	gr. i — gr. iii.

10. Extractum colchici aceticum - - Dose gr. i — gr. iii.
11. Vinum colchici - - - - - - „ ♏ xx — f ʒi.
12. Enema tabaci - - - - - - - „ f ℥ iv — f ℥ vi.
13. Lobeliæ inflatæ pulvis - - - - „ gr. v — gr. x.
14. Lobeliæ tinctura - - - - - - „ ♏ x — f ʒ ss.
15. Lobeliæ tinctura ætherea - - - „ ♏ x — f ʒ ss.

(The tincture of lobelia may be given in doses of f ʒi to f ʒii as a depressant remedy; but, for this purpose, tartar emetic is greatly to be preferred to all other medicines.)

Depressants in the form of Draught or Mixture.

242. ℞. Vin. Antim. pot. tart. f ℥ss.
Aquæ cinnamom.
Aquæ destill. āā f ℥iiss.
Syrup. simplicis f ℥ss. M.
(A sixth or a fourth part for a dose.)

243. ℞. Tinct. lobeliæ f ℥ss.
Aquæ anethi f ℥ii.
Aquæ f ℥iv. M.
(A sixth part for a dose.)

244. ℞. Tabaci fol. ℈i.
Aq. fervent. ʒviii.
Macera per horam et cola. Fiat enema. (In ileus, strangulated hernia, tetanus, &c.)

245. ℞. Vin. antim. pot. tart. f ℥i.
Syrupi papaveris f ℥i.
Aquæ f ℥vi. M.
(One or two table-spoonfuls for a dose.)

246. ℞. Vin. ipecac. f ℥ss.
Aquæ cinnam. f ℥i.
Aquæ f ℥ivss. M.
(A sixth or a fourth part for a dose.)

Depressants in the form of Powder.

247. ℞. Antim. pot. tart. gr. i.
Sacch. alb. gr. xxxi.
M. f. pulvis. (This powder admits of easy division into fractional parts, and may be given three or four times a-day in doses proportioned to the age, in the inflammatory affections of young children.)

248. ℞. Antim. pot. tart. gr. i.
Pulv. ipecac. ℈i.
M. f. pulvis in chartulas viii dividenda. (One to be taken three or four times a-day.)

249. ℞. Antim. pot. tart. gr. i.
Hyd. c. cretâ gr. xii.
Sacch. alb. ℥i.
M. Divide into eight powders. (One to be taken three or four times a-day. In inflammatory cutaneous affections; in pertussis and bronchitis of children.)

250. ℞. Antim. pot. tart. gr. ii.
Sacchari alb. ʒss.
M. Divide into eight, or into six, powders. (One to be taken every three hours in pneumonia.)

11. EMETICS.

Preparations of the London Pharmacopœia.

There are two classes of emetics; the one consisting of stimulants (p. 602), the other of depressants (p. 628). A certain dose of either class of substances will excite vomiting. The following formulæ comprise medicines of both classes:—

251. ℞. Vini ant. pot. tart. f ℥ss.
Fiat haustus emeticus.

252. ℞. Vini ipecacuanhæ f ℥ss.
Fiat haustus emeticus.

253. ℞. Pulv. ipecac. ℈i.
Vin. ant. pot. tart. f ℥ss.
Syrupi rhæados f ʒii.
Aquæ menthæ sativ. f ʒx.
M. f. haustus emeticus.

254. ℞. Zinci sulph. ℈i.
Aquæ cinnam.
Aquæ puræ āā f ℥ss.
M. fiat haustus emeticus.

255. ℞. Cupri sulph. gr. x.
Aquæ ℥iss.
M. fiat haustus emeticus.

256. ℞. Tabaci fol. ℥i.
Aquæ tepidæ q. s.
Contunde. Fiat epithema epigastrio applicand. (Must be removed as soon as sickness takes place.)

257. ℞. Sinapis pulv. ℥ss.
Aquæ f ℥iss.
M. fiat haustus emeticus.

258. ℞. Ammon. sesquicarb.
Pulv. ipecac. āā ℈i.
Tinct. capsici f ʒii.
Aquæ menthæ pip. f ℥ii.
M. f. haustus emeticus. (These more stimulating emetics are required when the sensibility of the stomach is impaired, as in poisoning with opium.)

12. DIAPHORETICS.

There are also two classes of diaphoretics; the one consisting of stimulants (p. 602), the other of depressants (p. 628).

Diaphoretics in the form of Draught or Mixture.

259. ℞. Potassæ nitratis ʒi.
Vin. antim. pot. tart. f ℥ss.
Liq. ammon. acet. f ℥ii.
Syrupi aurantii f ℥i.
Aquæ destill. f ℥ivss.
(Two table-spoonfuls for a dose.)

260. ℞. Liq. ammon. acet. f ℥iiss.
Mist. camph. f ℥iii.
Syrup. aurantii f ℥ss. M.
(A sixth part for a dose.)

261. ℞. Ammon. sesquicarb. ʒi.
Syrupi simp. f ℥i.
Aquæ ℥v. M.
(A sixth part for a dose.)

262. ℞. Potassæ carb. ʒii.
Vin. ant. pot. tart. f ʒiii—
f ℥ss.
Aquæ destill. ℥vss. M.
(A sixth part, with a table-spoonful of lemon-juice, for a dose.)

263. ℞. Spirit. æther. nit. f ℥i.
Liq. ammon. acet. f ℥ii.
Syrup. simp. f ℥i.
Aquæ f ℥iv. M.
(Two or three table-spoonfuls for a dose.)

264. ℞. Potassæ nitratis ℥ss.
Mist. amygd. f ℥vii.
Syrupi tolutani f ℥i. M.
(Two table-spoonfuls for a dose.)

265. ℞. Vin. colch. f ℥ss.
Tinct. opii ♏xl.
Liq. ammon. acet. f ℥ii.
Aquæ f ℥vss. M.
(Gout and muscular rheumatism, two table-spoonfuls for a dose.)

266. ℞. Tinct. guaiaci am. f ℥i.
Tinct. opii f ʒi.
Pulv. tragacanth. ʒii.
Aquæ cinnam. f ℥vii. M.
(Chronic rheumatism, two table-spoonfuls for a dose.)

Diaphoretics in the form of Pills and Powders.

267. ℞. Pulv. ipecac. C. gr. x.
Fiat pulvis h. s. s.

268. ℞. Hydrarg. chloridi gr. i.
Pulv. Jacobi veri gr. v.
Pulv. ipecac. gr. ii.
Conservæ rosæ caninæ q. s.
Ut fiant pilulæ duæ. (To be taken at bed-time.)

269. ℞. Pulv. ipecac. C. gr. v.
Fiat pulvis. (To be taken every six hours with a common saline draught.)

270. ℞. Pulv. ipecac. gr. i.
Pulv. antim. gr. iii.
Hydrarg. chloridi gr. $\frac{1}{3}$.
Sacchari gr. vi.
M. fiat pulvis.

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13. EXPECTORANTS.

Preparations of the London Pharmacopœia.

1.	Ammoniacum	Dose	gr. v to ʒ i.
2.	Mistura ammoniaci	„	f ℥ ss — f ℥ iss.
3.	Antimonii potassio-tartras	„	gr. $\frac{1}{8}$ — gr. $\frac{1}{4}$.
4.	Vin. ant. pot. tart.	„	f ʒ ss — f ʒ i.
5.	Balsamum Peruvianum	„	ʒ i — ʒ ii.
6.	Balsamum Tolutanum	„	ʒ i — ʒ ii.
7.	Tinctura Tolutana	„	f ʒ ss — f ʒ i.
8.	Benzoin	„	ʒ i — ʒ ii.
9.	Tinctura benzoini comp. (Friars' balsam)	„	f ʒ ss — f ʒ ii.
10.	Acidum benzoicum	„	gr. v — ʒ i.
11.	Galbanum	„	gr. x — ʒ i.
12.	Pulvis ipecacuanhæ	„	gr. i — gr iii.

13. Vinum ipecacuanhæ - - - - - -	Dose ♏ x to f ʒ ss.
14. Pulvis ipecacuanhæ comp. - - - -	„ gr. ii — gr. v.
15. Pilulæ ipecacuanhæ cum scillâ - - -	„ gr. v — gr. x.
16. Lobelia inflata - - - - - - - - -	„ gr. i — gr. v.
17. Tinctura lobeliæ - - - - - - - -	„ ♏ x — f ʒ i.
18. Tinctura lobeliæ ætherea - - - - - -	„ ♏ x — f ʒ i.
19. Pilulæ conii compositæ - - - - -	„ gr. v — gr. x.
20. Pilulæ scillæ compositæ - - - - - -	„ gr. v — gr. x.
21. Pilulæ styracis compositæ - - - - -	„ gr. v — gr. x.
22. Acetum scillæ - - - - - - - - - -	„ f ʒ ss — f ʒ i.
23. Oxymel scillæ - - - - - - - - - -	„ f ʒ i — f ʒ ii.
24. Tinctura scillæ - - - - - - - - - -	„ ♏ x — f ʒ ss.
25. Tinctura camphoræ comp. - - - -	„ f ʒ ss — f ℥ ss.

Expectorants in the form of Mixture or Draught.

271. ℞. Tinct. digital. f ʒi.
Oxymel. scillæ f ℥ss.
Tinct. opii f ʒss.
Aquæ ℥vss. M.
(A sixth part for a dose.)

272. ℞. Decoct. senegæ f ℥iii.
Liq. ammon. acet.
Misturæ acaciæ.
Syrup. papav. āā f ℥i. M.
(A sixth part for a dose.)

273. ℞. Tinct. camph. comp. f ℥i.
Syrupi zingib. f ℥i.
Mist. acaciæ f ℥ii. M.
Decoct. senegæ f ℥iv.
(Two table-spoonfuls for a dose.)

274. ℞. Mist. ammoniaci f ℥iv.
Vin. antim. pot. tart. f ℥ss.
Tinct. camph. comp. f ℥ss.
Syrup. tolut. f ℥i. M.
(A sixth part for a dose.)

275. ℞. Spirit. æther. nitric.
Syrupi tolutani āā f ℥i. M.
(A tea-spoonful to be taken occasionally when the cough is troublesome.)

276. ℞. Vin. ant. pot. tart. f ℥ss.
Liq. ammon. acet. f ℥ii.
Oxymellis scillæ f ℥ii.
Aquæ f ℥iss. M.
(A table-spoonful for a dose.)

277. ℞. Aceti scillæ f ℥ss.
Oxymellis ℥iss.
M. f. linctus. (A tea-spoonful for a dose.)

278. ℞. Vini ipecac. f ℥ss.
Potassæ carb. ʒii.
Aquæ f ℥vss. M.
(Two table-spoonfuls to be taken three or four times a-day, with a table-spoonful of lemon-juice.)

279. ℞. Sodæ carb. ʒi.
Vini ipecac. f ℥ss.
Tinct. opii f ʒi.
Syrupi tolut. f ℥ii.
Aquæ f ℥iss. M.
(One table-spoonful for a dose.)

Expectorants in the form of Pills or Powders.

280. ℞. Pil. scillæ c.
Ext. conii āā ʒss. M.
Divide into twelve pills. (One or two to be taken three times a-day.)

281. ℞. Pulv. scillæ.
—— ipecac. āā gr. i.
Ext. conii ʒss. M.
Divide into ten pills. (One to be taken three times a-day.)

282. ℞. Pulv. scillæ.
Pulv. ipecac. āā ℈i.
Ext. strammonii gr. v.
Ext. lactucæ gr. xv. M.
Divide into twelve pills. (One to be given three or four times a-day.)

283. ℞. Antim. pot. tart. gr. iss.
Pulv. ipecac. gr. xii.
Pulv. glycirrhizæ ʒi. M.
Divide into twelve powders.

284. ℞. Antim. pot. tart. gr. i.
Pulv. ipecac. gr. x.
Pulv. opii gr. ii.
Pulv. glycirrhizæ ʒi. M.
Divide into ten powders.

285. ℞. Ext. strammonii gr. iii.
Ext. glycirrhizæ ʒii. M.
Divide into twelve pills. (To be taken as lozenges, three or four times a-day.)

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14. DEMULCENTS.

Preparations of the London Pharmacopœia.

1. Acaciæ gummi.
2. Mistura acaciæ.
3. Tragacantha.
4. Pulvis tragacanthæ compositus.
5. Amygdalæ (dulces).
6. Confectio amygdalæ.
7. Mistura amygdalæ.
8. Pulvis glycirrhizæ.
9. Extractum glycirrhizæ.
10. Infusum lini compositum.
11. Decoctum malvæ compositum.
12. Syrupus althææ, syrupus tolutanus.
13. Decoctum cydoniæ.
14. Decoctum hordei.
15. Decoctum hordei compositum.
16. Mel.
17. Amylum.
18. Decoctum amyli.
19. Decoctum cetrariæ.
20. Cetaceum.
21. Ichthyocolla.
22. Confectio rosæ; confectio rosæ caninæ.

286. ℞. Camphoræ ʒss.
Potassæ nitr. ʒi.
Pulv. acaciæ ʒi
Mist. amygd. ℥vi. M.
(A sixth part for a dose in chordee, strangury, &c., with diluents.)

287. ℞. Cetacei ʒii.
Vitel. ovi unius.
Syrup. tolut.
Aquæ cinnam. āā f ℥i.
Aquæ f ℥iv. M.
(A table-spoonful for a dose, to be taken at short intervals in bronchitis.)

288. ℞. Potassæ nitr. ℥ss.
Mannæ opt. ℥ii.
Infus. lini comp. Oii. M.
(A wine-glassful to be taken frequently in gonorrhœa.)

289. ℞. Cornu cervi rament. ℥iv.
Micæ panis ℥i.
Aquæ lb. iii.
Boil down to two pounds, strain and add—
Syrup. simp. ℥i.
Aquæ cinnam. ℥i. M.
(A wine-glassful to be taken frequently in chronic diarrhœa, as a light nourishment during convalescence.)

290. ℞. Althææ offic. ℥i.
Aquæ bullient. lb. ii.
Syr. simp. q. s. M.
(To be used as a common drink in affections of the urinary organs.)

291. ℞. Icthyocollæ ℥ii.
Aquæ lb. ii.
Boil down to one pound, strain, and add—
Lactis vaccini lb. ii.
Sacchari ℥i. M.
(A wine-glassful to be taken frequently, as a demulcent and nutritive.)

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15. EMOLLIENTS.

Preparations of the London Pharmacopœia.

1. Decoctum papaveris.
2. Decoctum malvæ compositum.
3. Cataplasma lini.
4. Oleum amygdalæ, lini, olivæ, and papaveris.
5. Unguentum cetacei, sambuci.
6. Cera alba, ceratum cetacei.
7. Sapo, linimentum saponis, emplastrum saponis, ceratum saponis compositum.

292. ℞. Decoct. malvæ comp. Oi.
Liq. plumbi diacet. ʒi-ʒii.
M. f. lotio. (In various skin diseases, as lichen, eczema, and impetigo.)

293. ℞. Decoct. dulcamaræ.
Decoct. malvæ comp. āā Oss.
M. f. lotio. (In skin diseases, attended with much irritation.)

294. ℞. Ceræ albæ ʒi.
Ol. amygdalæ f ʒiv.
Aquæ rosæ f ℥iii. M.
(Known as "Galen's cerate.")

295. ℞. Misturæ amygdalæ ℥viii.
Acid. hydrocyanici dil. ʒii.
M. f. lotio. (In cutaneous diseases with itching.)

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16. LAXATIVES, APERIENTS, CATHARTICS.

Preparations of the London Pharmacopœia.

1.	Confectio cassiæ	Dose	ʒ ii	to	℥ i.
2.	Manna	,,	℥ i	—	℥ ii.
3.	Oleum, amygdalæ, olivæ, and lini	,,	℥ i	—	℥ ii.
4.	Sulphur sublimatum et lotum	,,	ʒ i	—	℥ ss.
5.	Magnesia, and magnesiæ carbonas	,,	℈ i	—	ʒ i.
6.	Potassæ sulphas and bisulphas	,,	℈ i	—	℥ ss.
7.	Potassæ tartras and bitartras	,,	ʒ ii	—	℥ i.
8.	Sodæ sulphas and phosphas	,,	℥ ss	—	℥ ii.
9.	Sodæ potassio-tartras	,,	ʒ ii	—	℥ i.
10.	Sodii chloridum	,,	℥ ss	—	℥ ii.
11.	Oleum ricini	,,	℥ ss	—	℥ i.
12.	Infusum sennæ compositum	,,	℥ i	—	℥ ii.
13.	Tinctura sennæ composita	,,	ʒ i	—	℥ ss.
14.	Syrupus sennæ	,,	ʒ ii	—	℥ ss.
15.	Confectio sennæ	,,	ʒ ii	—	ʒ i.
16.	Hydrargyrum cum cretâ	,,	gr. i	—	gr. v.
17.	Pilulæ hydrargyri	,,	gr. i	—	gr. v.
18.	Hydrargyri chloridum	,,	gr. i	—	gr. v.
19.	Pulvis rhei	,,	gr. x	—	℈ i.
20.	Pilulæ rhei compositæ	,,	gr. v	—	℈ i.
21.	Extractum rhei	,,	gr. x	—	ʒ ss.
22.	Infusum rhei	,,	℥ ss	—	℥ ii.
23.	Tinctura rhei composita	,,	℥ ss	—	℥ i.
24.	Pulvis jalapæ	,,	gr. x	—	℈ i.
25.	Pulvis jalapæ compositus	,,	℈ i	—	ʒ i.
26.	Tinctura jalapæ	,,	ʒ i	—	ʒ ii.
27.	Extractum jalapæ	,,	gr. v	—	℈ i.
28.	Pulvis scammoniæ	,,	gr. x	—	℈ i.
29.	Pulvis scammoniæ compositus	,,	gr. x	—	ʒ ss.
30.	Confectio scammoniæ	,,	℈ i	—	ʒ i.
31.	Extractum colocynthidis	,,	gr. v	—	℈ i.
32.	Pilulæ colocynthidis compositæ	,,	gr. v	—	℈ i.
33.	Extractum aloes	,,	gr. v	—	℈ i.
34.	Pulvis aloes compositus	,,	gr. x	—	ʒ ss.
35.	Pilulæ aloes compositæ	,,	gr. x	—	ʒ ss.
36.	Pilulæ aloes cum myrrha	,,	gr. x	—	ʒ ss.
37.	Pilulæ aloes cum sapone	,,	gr. x	—	ʒ ss.

38.	Decoctum aloes compositum	Dose	℥ ss to ℥ ii.
39.	Vinum aloes	,,	℥ ss — ℥ i.
40.	Tinctura aloes	,,	ʒ ss — ʒ ii.
41.	Tinctura aloes composita	,,	ʒ ss — ʒ ii.
42.	Pulvis cambogiæ	,,	gr. ii — gr. v.
43.	Pilulæ cambogiæ compositæ	,,	gr. v — ℈ i.
44.	Extractum elaterii	,,	gr. ¼ — gr. i.
45.	Oleum terebinthinæ	,,	℥ ss — ℥ ii.
46.	Pulvis hellebori nigri	,,	gr. x — ℈ i.
47.	Tinctura hellebori	,,	ʒ ss — ʒ i.
48.	Oleum tiglii	,,	♏ i — ♏ iii.

Laxatives, Aperients, Cathartics, in the form of Mixture or Draught.

296. ℞. Magnesiæ sulph. ʒvi.
Mannæ optimæ ʒii.
Aquæ destill. f ʒxii. M.
Fiat haustus aperiens.

297. ℞. Potassæ tartratis ℥i.
Mannæ optimæ ℥i.
Aquæ destill. f ℥vi.
(A sixth part for a dose.)

298. ℞. Pulv. rhei gr. x.
Potassæ tartratis ℥ss.
Infusi sennæ comp. f ʒxii.
Syrupi aurantii.
Tinct. cardam. comp. āā f ʒii.
M. fiat haustus aperiens.

299. ℞. Potassæ tartratis ℥ii.
Infusi quassiæ f ℥ii.
Infusi sennæ C. f ℥iv.
Tinct. sennæ comp.
Syrupi aurantii āā f ℥i. M.
(Two table-spoonfuls for a dose.)

300. ℞. Infus. rosæ comp. f ℥vii.
Magnesiæ sulphatis ℥ii.
Syrupi rosæ f ℥i. M.
(Two table-spoonfuls for a dose.)

301. ℞. Sodæ potassio-tart. ℥ss.
Magnesiæ calcinatæ gr. x.
Aquæ menthæ pip. ℥i.
M. fiat haustus aperiens.

302. ℞. Confectionis aromaticæ.
Pulveris rhei āā ʒi.
Tinct. cardamomi.
Syrupi zingiberis āā ℥i.
Aquæ menth. pip. f ℥vi. M.
(Two or three table-spoonfuls for a dose.)

303. ℞. Magnesiæ sulphatis ℥ss.
Infusi sennæ comp. f ℥iss.
Tinct. sennæ comp. ℥ss.
Fiat haustus aperiens.

304. ℞. Antim. pot. tart. gr. i.
Magnesiæ sulph. ℥ii.
Aquæ destill. f ℥vii.
Syrupi aurantii f ℥i. M.
(Two or three table-spoonfuls for a dose.)

305. ℞. Tinct. sennæ comp. f ℥ii.
Vini aloes f ℥ii.
Syrupi zingiberis f ℥i.
Aquæ menthæ piper. f ℥iii M.
(Two table-spoonfuls for a dose.)

306. ℞. Radicis amoraciæ cont. ℥ii.
Seminis sinapis.
Radicis valerianæ āā ʒii.
Radicis rhei incisæ ℥ss.
(Infuse in a pint and a half of port wine, and give a wine-glassful as a warm aperient.)

307. ℞. Potass. carbon.
Myrrhæ contusæ.
Aloes socotrinæ āā ʒii.
Croci ʒi.
Aquæ destill. Oi.
Boil down to xii, and add—
Tinct. cardam. comp. ℥iv.
(Two table-spoonfuls for a dose.)

308. ℞. Olei ricini f ℥iss.
Vitellum ovi unius.
Mix carefully, and add—
Aq. menthæ viridis f ℥v.
Syrupi aurantii f ℥i. M.
(Two table-spoonfuls for a dose.)

309. ℞. Olei ricini.
Olei terebinth.
Misturæ acaciæ.
Aquæ menth. pip. āā f ℥ss.
M. f. haustus.

Laxatives, Aperients, Purgatives, in the form of Pill, Powder, &c.

310. ℞. Pulv. rhei ℈i.
Potass. bitartratis ʒi.
Pulv. cinnam. comp. gr. v.
M. fiat pulvis aperiens.

311. ℞. Pulveris rhei ʒss.
Myrrhæ optimæ ℈i.
Olei juniperi ♏i. M.
Divide into twelve pills. (Two for a dose.)

312. ℞. Saponis duri gr. v.
Ext. colocynth. comp.
Ext. gentianæ āā gr. ii.
Pulv. rhei q. s. M.
Divide into two pills. (To be taken at night.)

313. ℞. Aloes pulv.
Pulv. zingiberis āā ʒss.
Ext. anthemidis ℈ii. M.
Divide into twenty pills. (One or two to be taken an hour before dinner, as "dinner-pills.")

314. ℞. Ext. colocynth. comp.
Pil. galban. comp. āā gr. v.
Olei carui ♏i.
M. fiant pilulæ duæ.

315. ℞. Pulv. aloes comp. gr. viii.
Olei anisi ♏ii. M.
Fiant pilulæ duæ.

316. ℞. Pil. aloes cum myrrhâ.
Sapon. duri āā gr. v.
M. Fiant pilulæ duæ.

317. ℞. Aloes socotrinæ gr. iii.
Sapon. duri gr. v.
M. Fiant pilulæ duæ.

318. ℞. Assafœtidæ.
Pulv. rhei āā gr. iv.
Olei anisi ♏ii.
M. Fiant pilulæ duæ.

319. ℞. Pil. aloes cum myrrhâ gr. vi.
Pulv. capsici gr. ii.
M. fiant pilulæ duæ.

320. ℞. Ext. colocynth.
Ext. gentianæ comp. āā ʒss.
M. fiant pilulæ xii.

321. ℞. Sulphuris loti.
Potassæ bitartratis āā ℥i.
Pulv. jalapæ ʒi.
Pulv. cinnam. comp. ʒi.
Mellis vel theriacæ q. s.
Fiat electuarium. (A tea-spoonful or dessert-spoonful for a dose two or three times a-day.)

322. ℞. Hydrarg. chloridi gr. i.
Pulv. rhei.
Saponis duri āā gr. iv.
Olei anethi ♏i.
M. fiant pilulæ duæ.

323. ℞. Pulv. scammon. gr. iv.
Hydrarg. chloridi gr. iii.
Sacch. pur. gr. v.
Fiat pulvis catharticus. (To be taken in a little honey.)

324. ℞. Pulv. rhei gr. x.
Hydr. chloridi gr. iii.
Pulv. cinnam. comp. gr. v.
M. Fiat pulvis aperiens. (To be taken in honey.)

325. ℞. Pulv. scammon. comp. ℈ss.
Hydrarg. submuriat. gr. v.
M. fiat pulvis catharticus.

326. ℞. Ext. colocynth. comp.
Hydrarg. chloridi āā gr. v.
M. fiant pilulæ duæ.

327. ℞. Pulv. scammonii.
Hydrarg. chloridi.
Ext. colocynth. āā ℈i.
Ol. anethi q. s. M.
(Divide into twelve pills.)

328. ℞. Ext. colocynth. comp.
Ext. jalapæ āā ʒss.
Gambogiæ ℈ss.
Olei juniperi ♏iv.
M. Fiant pilulæ xx.

329. ℞. Jalapinæ.
Pulv. rhei āā gr. ii.
Pulv. ipecac. gr. i.
Olei carui ♏i.
M. Fiant pilula.

330. ℞. Extract. elaterii gr. ii.
Sacch. pur. ʒi. M.
(Divide into eight powders, of which one to be taken every quarter of an hour till the bowels act.)

331. ℞. Olei tiglii ♏i.
Pulv. aloes q. s.
Ut fiat pilula.

332. ℞. Olei tiglii ♏i.
Ext. colocynth. comp. gr. v.
Pulv. rhei q. s. M.
(Divide into two pills.)

333. ℞. Olei tiglii ♏ii.
Jalapinæ gr. v.
Pulv. rhei q. s.
(Divide into four pills, of which give one every hour till the bowels act.)

PURGATIVE ENEMATA.

Preparations of the London Pharmacopœia.

1. Enema aloes.
2. Enema colocynthidis.
3. Enema terebinthinæ.
4. Enema assafœtidæ.

334. ℞. Infus. anthemidis f ℥x.
Sodæ sulphatis ℥i. M.

335. ℞. Ext. colocynth. ʒi.
Infus. sennæ f ℥xii. M.

336. ℞. Ext. aloes socotrinæ ʒi.
Lactis communis ℥vi. M.

337. ℞. Decoct. althææ f ℥x.
Sodæ sulphatis ℥i.
Olei olivæ f ℥i. M.

338. ℞. Sodii chloridi ℥ii.
Decocti avenæ Oi. M.

339. ℞. Olei ricini f ℥iii.
Potassæ carbonatis ℈i.
Saponis ʒi.
Aquæ ferventis Oi. M.

340. ℞. Olei terebinthinæ f ℥i.
Misturæ acaciæ f ℥ii.
Dec. avenæ f. ℥xvii M.

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17. DIURETICS.

Preparations of the London Pharmacopœia.

1. Saline substances generally, especially the following:—

Potassæ carbonas	Dose	gr. x	to	ʒ i.
Potassæ bicarbonas	„	gr. x	—	ʒ i.
Liquor potassæ effervescens	„	℥ i	—	℥ ii.
Potassæ nitras	„	gr. x	—	ʒ i, or more.
Potassæ chloras	„	gr. x	—	℈ i.
Potassæ acetas	„	gr. x	—	ʒ i.
Potassæ bitartras	„	ʒ ss	—	ʒ ii.
Sodæ acetas	„	ʒ ss	—	ʒ ii.
Sodæ potassio-tartras	„	ʒ ss	—	ʒ ii.
Sodæ sesquicarbonas	„	gr. x	—	ʒ i.
Liquor sodæ effervescens	„	℥ i	—	℥ ii.

2. Stimulants; among which the following are the chief:—

Liquor ammoniæ acetatis	Dose	℥ ss	to	℥ i.
Spiritus ætheris nitrici	„	ʒ ss	—	ʒ i.
Oleum juniperi	„	♏ iv	—	♏ vi.
Spiritus juniperi compositus	„	ʒ i	—	℥ ss.
Oleum terebinthinæ	„	ʒ ss	—	ʒ ii.
Tinctura cantharidis	„	♏ v	—	♏ x.
Infusum armoraciæ compositum	„	℥ i	—	℥ ii.
Decoctum scoparii compositum	„	℥ i	—	℥ ii.
Decoctum senegæ	„	℥ i	—	℥ ii.
Infusum diosmæ (buchu)	„	℥ i	—	℥ ii.
Decoctum chimaphilæ	„	℥ i	—	℥ ii.
Decoctum uvæ ursi	„	℥ i	—	℥ ii.
Extractum uvæ ursi	„	gr. v	—	gr. x.
Infusum pareiræ	„	℥ i	—	℥ ii.
Extractum pareiræ	„	gr. v	—	gr. x.
Copaiba	„	♏ xx	to	ʒ ss.

Pulv. cubebæ	Dose	℈ i — ʒ i.
Tinctura cubebæ	,,	ʒ i — ℥ ss.

3. Depressants and sedatives, of which the following are the chief:—

Pulvis digitalis	Dose	gr. i to gr. iii.
Infusum digitalis	,,	℥ ss — ℥ i.
Tinctura digitalis	,,	♏ x, cautiously increased to ♏ xl.
Extractum digitalis	,,	gr. ¼ to gr. i.
Tabacum.		
Acetum scillæ	,,	ʒ ss — ʒ i.
Tinctura scillæ	,,	♏ x — ʒ ss.

Allium (sativum, cepa, and porrum.)

The preparations of colchicum and veratrum; also the preparations of mercury.

Diuretics in the form of Mixture and Draught.

341. ℞. Potassæ acetat. ℥ss—℥i.
Syrupi simplicis f ℥iii.
Spirit. æther. nitrici. f ℥i. M.
(A tea-spoonful for a dose.)

342. ℞. Potas. acet. ʒii.
Infus. quassiæ f ℥vi.
Tinct. digitalis f ʒi. M.
(A sixth part for a dose.)

343. ℞. Infus. digital. f ℥iii.
Potassæ acetat. ʒiii.
Spirit. æther. nit. f ℥i.
Liq. ammon. acetat. f ℥ii. M.
(A sixth part for a dose.)

344. ℞. Potassæ bitart. f ℥ss.
Cort. limon. et. sacch. q. s.
Aquæ fervent. lb. ii.
(For a common drink.)

345. ℞. Junip. bacc. contrit. ℥ii.
Sem. anisi contus. ʒii.
Aquæ ferventis lb. i. M.
Strain, after standing three hours: a wine-glassful frequently.

346. ℞. Infus. armoraciæ comp. f ℥vi.
Spirit. æther. nitrici f ℥i.
Syrupi aurantii f ℥i. M.
(Two or three table-spoonfuls for a dose.)

347. ℞. Copaibæ f ℥ss.
Vitellum unius ovi.
Sacch. pur. ℥i.
Mix carefully, and add—
Aquæ menthæ virid. f ℥vi.
(Three table-spoonfuls of the emulsion three or four times a-day.)

348. ℞. Tinct. ferri sesquichlor. ♏x.
Tinct. hyoscyami ♏x.
(To be taken in water every quarter of an hour till the patient passes urine.)

349. ℞. Acet. colch. f ℥ss.
Potassæ acet. ℥ss.
Aquæ fœnic. f ℥vii.
Spirit. junip. comp. f ℥ss. M.
(Two table-spoonfuls for a dose.)

350 ℞. Spartii cacumin. concis. ℥i.
Aquæ Oi.
Boil down to one-half, then add—
Spirit. æther. nit.
Syrup zingiberis āā f ℥i.
(A wine-glassful for a dose.)

351. ℞. Decoct. uvæ ursi.
Liq. calcis āā f ℥iv. M.
(A wine-glassful for a dose.)

352. ℞. Infus. buchu f ℥vii.
Spirit. junip. c. f ℥i. M.
(Two table-spoonfuls for a dose.)

353. ℞. Infus. pareiræ f ℥viii.
Acid. nitr. dil. ♏xl.
Tinct. hyoscyami f ʒii. M.
(Two or three table-spoonfuls for a dose.)

Diuretics in the form of Pill, Powder, &c.

354. ℞. Pil. scillæ comp. ʒi.
Hyd. chloridi gr. v.
Ol. Juniperi ♏i. M.
(Divide into twenty pills.)

355. ℞. Pilulæ scillæ comp. gr. v.
Pilulæ hydrarg. gr. iii.
M. Fiant pilulæ duæ.

356. ℞. Pulv. digitalis gr. i—ii.
Hydrarg. chloridi. gr. ¼.
Pilulæ scillæ comp. gr. vi.
M. Fiant pilulæ duæ.

357. ℞. Terebinth. Chiæ gr. v.
Saponis duri gr. iv.
Pulv. calumbæ q. s.
M. Fiant pilulæ duæ.

358. ℞. Potassæ nit. gr. x.
Potassæ bitartrat. gr. xx.
Pulv. acaciæ. gr. x.
Sacch. ʒss.
M. fiat pulvis. (To be taken three or four times a-day in barley-water.)

359. ℞. Extracti pareiræ.
Papaveris āā ℈i.
Pulv. glycirrhizæ q. s. M.
(Divide into twelve pills.)

360. ℞. Extracti uvæ ursi ʒii.
Sodæ carb. ʒss.
Pulv. cinnam. c. ʒss.
Confect. rosæ caninæ ℥i.
Syrupi q. s.
Ut fiat electuarium. (A table-spoonful for a dose. Chronic inflammation of the kidneys and bladder, calculous affections, &c.)

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18. ANTHELMINTICS.

Preparations of the London Pharmacopæia.

1. Purgative medicines.
2. Pulvis stanni - - - - - - - Dose ℥ss to ℥i.
3. Ferri ramenta - - - - - - - ,, ℈i — ʒi.

4. Mucuna pruriens - - - - - - - Dose ʒ i to ℥ ss.
5. Pulvis corticis granati - - - - - ,, ℈ i — ʒ i.
6. Pulvis filicis maris - - - - - - ,, ℈ i — ʒ i.

An ethereal extract (dose gr. x to ℈i) and an essential oil (dose ʒi to ℥ss) are in use as remedies for tape-worm.

7. Pulv. radicis spigeliæ Marylandicæ - Dose ʒ i to ʒ ii.
8. Oleum terebinthinæ — - - - - - ,, ℥ ss — ℥ ii.

The kosso, an Abyssinian plant (dose ℥ ss to ʒ vi, infused in a pint of hot water), is one of the best of our anthelmintics.

361. ℞. Ol. terebinth. ℥i.
Decoct. hordei ℥i.
M. fiat haustus. (In tænia. The dose to be repeated every morning, or every other morning, for three or four times in succession.)

362. ℞. Ol. terebinth. ℥ss.
Ol. ricini. ℥i.
M. fiat haustus. (In tænia.)

363. ℞. Mucunæ prurientis ʒi.
Theriacæ ℥i.
M. fiat electuarium. (A tea-spoonful for a dose. In lumbrici and ascarides: should be followed by an occasional purgative.)

364. ℞. Hydr. chloridi gr. vi.
Jalapæ pulv. ℈i.
M. fiat pulvis.

365. Stanni pulv. ℥i.
Electuarii sennæ ℥ii.
(A table-spoonful for a dose.)

366. ℞. Pulv. rad. gran. cort. ℥ s
Divide in pulv. iv. (One powder to be taken every half hour. The last to be followed by an aperient. In tape-worm.)

367. ℞. Semin. santonici.
Semin. tanaceti āā ℥ss.
Pulv. valer.
Pulv. jalap.
Potass. sulph. āā ʒii.
Oxymel. scillæ q. s.
Ut fiat electuar. (A tea-spoonful to be taken night and morning.)

368. ℞. Cort. rad. granati recent. ℥ii.
Aquæ lb. ii.
(Infuse for twenty-four hours, then boil down to lb. i. A third part to be taken every half hour. In tænia.)

369. ℞. Decoct. filicis maris ℥iv.
(℥iss. ad lb. i.)
Æther sulph. ʒi.
M. fiat haustus mane sumendus. (In tænia.)

(Anthelmintics should be given on an empty stomach, and should be followed up after the interval of an hour by a full dose of castor oil.)

ANTHELMINTIC ENEMATA.

370. ℞. Mist. assafœtidæ.
Lactis vacc. āā f ℥iv.
M. fiat enema.

371. ℞. Ol. terebinth. f ℥ii.
Decoct. amyli f ℥viii.
M. fiat enema.

372. ℞. Absinthii.
Tanaceti āā ℥ss.
Valer. rad. contrit.
Cort. aurant. āā ʒii.
Aquæ fervent. ℥viii.
(Infuse for an hour, and inject night and morning. In ascarides.)

373. ℞. Tinct. ferri sesquichl. f℥ss.
Aquæ f ℥viii.
M. fiat enema. (In ascarides; a purgative of calomel and jalap being given simultaneously,—*Darwell*,—and camomile tea being drunk thrice a day for a fortnight afterwards.)

19. EMMENAGOGUES.

For this class of remedies, see Tonics, especially those containing steel, myrrh, and aloes, in amenorrhœa with anæmia; and Depressants in amenorrhœa with plethora. The stronger emmenagogues, such as savin, are rarely used. A stimulant injection containing ♏xii of liquor ammoniæ to ℥iss of warm milk has been recommended.

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20. ANTACIDS.

Preparations of the London Pharmacopœia.

1. Ammonia, and its salts.
2. Potash, and its salts.
3. Soda, and its salts.
4. Lime, chalk, and the preparations containing them.
5. Magnesia, and its salts.
6. Soap.

374. ℞. Liq. potassæ ♏ xx.
Mist. cretæ f ℥i.
Tinct. calumbæ f ʒi.
M. fiat haustus.

375. ℞. Liq. potassæ f ʒii.
Liq. calcis f ℥iv. M.
(A sixth part for a dose. In acidity, with tendency to lithic acid deposit in the urine.)

376. ℞. Potassæ carb. ʒi.
Infus. gent. comp. f ℥v.
Tinct. cascarillæ f ℥i. M.
(A sixth part for a dose.)

377. ℞. Magnes. sulphat. ℥i.
Magnes. carb. ʒi.
Aquæ menthæ pip.
Infus. gent. comp.
āā f ℥iv. M.
(Two table-spoonfuls for a dose. Antacid and aperient.)

378. ℞. Magnes. carb. ʒii.
Pulv. rhei ℈ii.
Spirit. ammon. arom.
Syrup. zingib. āā f ℥ss.
Aquæ puræ f ℥v. M.
(A sixth part for a dose. In gastralgia, pyrosis, &c.)

379. ℞. Liq. calcis.
Lactis. vac. āā ℥vi.
M. sit pro potu.

380. ℞. Ammon. sesquicarb. ʒss.
Sodæ carb. ʒi.
Infus. quassiæ ℥vi. M.
(A sixth part for a dose.)

381. ℞. Sodæ carb. ʒiss.
Pulv. cinnam. comp.
Saponis āā ʒss.
Balsam. Peruv. q. s.
Ut fiant pil. xxx. (Three pills for a dose, to be taken two or three times a-day.)

21. ANTISEPTICS.

Preparations of the London Pharmacopœia.

1. Carbo.
2. Carbo animalis.
3. Cataplasma carbonis.
4. Cataplasma fermenti.
5. Cataplasma sodæ chlorinatæ.
6. Liquor chlorinii.
7. Liquor sodæ chlorinatæ.

22. ALTERATIVES.

(Including Antisyphilitic and Deobstruent Remedies.)

Preparations of the London Pharmacopœia.

1. Hydrargyrum c. cretâ; pilulæ hydrargyri; hydrargyri iodidum; pilulæ hydrargyri iodidi; hydrargyri biniodidum; hydrargyri ammonio-chloridum; pilulæ hydrargyri chloridi compositæ; hydrargyri bichloridum; liquor hydrargyri bichloridi; hydrargyri bicyanidum; hydrargyri bisulphuretum; hydrargyri nitrico-oxidum.
2. Iodinium; tinctura iodinii composita; potassii-iodidum; liquor potassii iodidi compositus; ferri iodidum; syrupus ferri iodidi; plumbi iodidum; burnt sponge.
3. Brominium (dose ♏ v of an aqueous or alcoholic solution, containing one part of bromine in forty parts of water or spirit); potassii bromidum. (Dose gr. iii—gr. v.)
4. Acidum arseniosum; liq. potassæ arsenitis; liq. arsenici chloridi.
5. (A chloride of gold and sodium, dose gr. ⅛ to gr. ½, is in use as an alterative.)
6. Acidum nitro-muriaticum.
7. Antimonii oxysulphuretum; antimonii potassio-tartras; vinum antimonii potassio-tartratis.
8. Barii chloridum; liquor barii chloridi.
9. Manganesii sulphas.
10. Decoctum sarsæ; decoctum sarsæ comp.; extractum sarsæ; syrupus sarsæ.

11. Decoctum dulcamaræ.
12. Decoctum chimaphilæ.
13. Extractum taraxaci.
14. Decoctum taraxaci.
15. Oleum morrhuæ.
16. Potassii sulphuretum.

Alteratives in the form of Mixture or Draught.

382. ℞. Hydrarg. bichlorid. gr. ii.
Spirit. rectif. ℥ss.
Aquæ destil. ℥iiiss. M.
(A tea-spoonful for a dose.)

383. ℞. Hyd. bichlorid. gr. i.
Tinct. cinchonæ ℥ii.
Solve. (A tea-spoonful for a dose. In scrofula.)

384. ℞. Potass. iodidi ʒss.
Infus. quassiæ ℥vi. M.
(A sixth part for a dose. Secondary syphilis.)

385. ℞. Tinct. iodinii comp. ʒi.
Aquæ destill. ℥vi. M.
(A sixth part for a dose. The dose may be gradually increased.)

386. ℞. Ferri iodidi ℈i.
Infus. quassiæ ℥vi. M.
(A sixth part for a dose.)

387. ℞. Syrupi ferri iodidi ♏xxx—ʒi.
(To be taken three times a-day in a cup of water.)

388, ℞. Ext. sarsæ ℈i.
Decoct. sarsæ ℥ii.
M. fiat haustus.

389. ℞. Solutionis hydriodatis arsenici et hydrargyri (Donovan) f ℥ss.
Syrupi zingiberis f ℥i.
Aquæ f ℥viss. M.
(A table-spoonful for a dose twice a-day.)

390. ℞. Stipit. dulcamaræ. cont. ℥i.
Rad. glycyrr. contusæ ℥i.
Aquæ destill. Oiss.
Boil for a quarter of an hour. (A wine-glassful for a dose four times a-day.)

391. ℞. Acidi nitrici dil. f ʒss.
Acidi hydrochlorici dil. ʒi.
Spirit. æther. nitrici f ℥ss.
Syrupi sarsæ f ℥i.
Aquæ f ℥viss. M.
(Two table-spoonfuls for a dose.)

392. ℞. Decocti sarsæ comp. f ℥viiss.
Acidi nitrici dil. f ʒi.
Tinct. hyosyami f ʒii. M.
(A fourth part for a dose.)

393. ℞. Liq. potass. arsenitis ʒss.
Infus. quassiæ ℥v.
Tinct. lupuli ℥i. M.
(A sixth part for a dose.)

394. ℞. Manganesii sulphatis ℈i.
Magnesiæ sulphatis ʒi.
Syrupi zingiberis f ʒi.
Aquæ cinnam. f ℥ss.
Aquæ f ℥i.
M. f. haustus.

395. ℞. Potassii bromidi ℈i.
Syrup. tolut. f ℥i.
Aquæ destill. f ℥vii. M.
(Two table-spoonfuls for a dose.)

Alteratives in the form of Pill, Powder, &c.

396. ℞. Hydrarg. chloridi gr. i.
Ext. conii gr. iii.
Misce ut fiat pilula, ter in die sumenda.

397. ℞. Pil. hyd. chlor. comp. ʒss.
Ext. sarsæ.
Ext. tarax. āā ʒi.
(Divide into thirty pills, of which two to be taken three times a-day.)

398. ℞. Pilulæ hydrarg. gr. i.
Guaiaci gum. resin. gr. viii.
Mucilaginis acaciæ q. s.
Fiant pilulæ duæ ter in die sumendæ.

399. ℞. Plumbi iodidi gr. iv.
Confect. rosæ q. s.
Ut fiat pil. xii. (One pill to be taken night and morning.)

400. ℞. Ferri iodidi ʒss.
Ext. gentianæ ʒiss. M.
Divide into twenty-four pills.

401. ℞. Hyd. iodidi gr. v.
Ext. sarsæ.
Ext. gentianæ āā ℈i. M.
Divide into ten pills.

402. ℞. Hyd. biniodidi gr. i.
Ext. glycirrh. ʒi. M.
Divide into sixteen pills.

403. ℞. Hydrarg. c cretâ ℈i.
Antim. pot. tart. gr. i.
Sacchari ℥i. M.
Divide into ten powders.

404. ℞. Auri chloridi gr. v.
Ext. sarsæ ℥ss.
M. fiat massa in pil. c. distrib. sumat unam bis terve quotidie.

405. ℞. Hydrarg. chloridi gr. ¼.
Ext. opii gr. ss.
Confectionis rosæ q. s.
M. fiat pilula ter in die sumenda.

406. ℞. Pulv. opii.
Hydrarg. chloridi āā gr. ¼.
Pulv. antim. gr. iii. M.
Fiat pulvis. (To be taken three times a-day in honey.)

407. ℞. Hydrarg. c. cretâ ℈i.
Pulv. ipecac. gr. x.
Pulv. rhei.
Pulv. cinnam. c āā ʒss.
Sacchari albi ʒi. M.
Divide into ten powders. (One to be taken three times a-day.)

ANTIDOTES TO THE PRINCIPAL POISONS.

Acids, Mineral.—Calcined magnesia or carbonate of magnesia; carbonate of lime, as common chalk, whiting, prepared chalk, or compound chalk powder; a dilute solution of carbonate of soda; in an emergency, soap-suds, or the plaster of an apartment, broken up and diffused through water.

Acids, Vegetable.—Carbonate of lime, as common chalk, whiting, prepared chalk, or compound chalk powder. Carbonate of soda.

Alkalies and their Carbonates.—Vinegar and water; oil.

Ammonia and its Carbonate.—Vinegar and water.

Antimony, Chloride of.—Magnesia, carbonate of soda.

Arsenious Acid and the Soluble Arsenites.—No certain antidotes. Hydrated oxide of magnesia; magnesia in a state of fine division; the hydrated sesqui-oxide of iron; and powdered charcoal may be given. Also, a mixture of oil and lime water.

Baryta and its Soluble Salts.—Sulphate of magnesia or sulphate of soda.

Baryta, Carbonate of.—Sulphate of magnesia mixed with weak vinegar.

Copper, Soluble Salts of.—White of egg, milk, or flour and water.

Hydrocyanic Acid.—After cold affusion, the mixed oxides of iron diffused through water.

Iron, Sulphate of.—Carbonate of soda or carbonate of ammonia.

Lead, Soluble Salts of.—Sulphate of soda or magnesia.

Lead, Carbonate of.—Sulphate of magnesia with vinegar and water.

Lime.—Vinegar and water.

Mercury, Soluble Salts of.—White of egg; flour and water.

Muriatic Acid.—*See* Acids, Mineral.

Nitric Acid.—*See* Acids, Mineral.

Opium and its Preparations.—No antidote. Treatment by emetics, the stomach-pump, cold affusion, electro-magnetism; the patient to drink freely of strong coffee.

Oxalic Acid and the Soluble Oxalates.—Common chalk, whiting, prepared chalk, or compound chalk powder.

Phosphorus.—No antidote. Magnesia diffused through water, or suspended in mucilage, may be given with advantage.

Potash and its Carbonates.—Vinegar and water; oil.

Silver, Nitrate of.—Solution of common salt.

Soda and its Carbonates.—Vinegar and water; oil.

Sulphuric Acid.—*See* Acids, Mineral.

Tartar Emetic.—Tincture of bark, kino, or catechu; decoction of cinchona, or of oak bark; strong tea.

Zinc, Sulphate of.—Milk, magnesia, or a dilute solution of carbonate of soda.

GLOSSARY.

Abscess. (*Abscessus*, from *abscedo*, to escape).

Adynamia. Want of power (α, priv., δύναμις, power).

Acne. Pimple (ἄχνη, scurf).

Amaurosis. Blindness (ἀμαυρὸς, obscure).

Amenorrhœa. Deficiency of the menses (α, priv., μὴν, a month, ῥέω, to flow).

Anæmia. Want of blood (α, priv., αἷμα, blood).

Anæsthesia. Loss of the sense of touch (α, priv., αἴσθησις, perception).

Anasarca. Dropsy of the flesh (ἀνὰ, and σὰρξ, the flesh).

Aneurism. Vascular dilatation (ἀνευρύνω, to dilate).

Angina. Choking (ἄγχω, to throttle).

Anuria. Suppression of urine (α, priv., οὐρέω, to pass urine).

Aphtha. Thrush (αφθα, from ἄπτω, to inflame).

Apnœa. Breathlessness (α, priv., πνέω, to breathe).

Apoplexia. The stroke (ἀποπληξία, from ἀποπλήσσω, to strike down).

Arachnitis. Inflammation of the arachnoid (ἀράχνη, a spider's-web, εἶδος, likeness).

Ascaris. An intestinal worm (ἀσκαρὶς, from ἀσκαρίζω, to jump).

Ascites. Dropsy of the belly (ἀσκίτης, from ἀσκὸς, a sack).

Asphyxia. Apparent death (α, priv., σφύξις, the pulse).

Asthma. Difficulty of breathing (ἆσθμα, from ἀσθμάζω, to gasp).

Atheroma. A species of encysted tumour (ἀθάρη, porridge).

Atrophia. Wasting (α, priv., τροφὴ, nourishment).

Bronchitis. Inflammation of the bronchi (βρόγχος, the windpipe).

Bronchocele. An enlargement of the thyroid gland (βρόγχος, the windpipe, κήλη, a tumour).

Cachexia. Bad habit of body (κακὴ, bad, ἕξις, habit).

Calculus. A little stone (Lat. *calculus*).

Cancer. A malignant disease (*cancer*, a crab).

Carcinoma. Cancer (καρκίνος, a crab).

Cardialgia. Pain in the stomach (καρδία, the heart, ἄλγος, pain).

Carditis. Inflammation of the heart (καρδία, the heart).

Catalepsis. Catalepsy (καταλαμβάνω, to seize).

Catarrhus. A cold (κατὰ, down, ῥέω, to flow).

Cephalalgia. Headache (κεφαλὴ, the head, ἄλγος, pain).

Cephalæa. (κεφάλαια, a headache).

Cheloidea. A cutaneous disease (χέλυς, a tortoise, εἶδος, likeness).

Chlorosis. Greensickness (χλωρὸς, green).

Cholera. Flux (χολὴ, bile, ῥέω, to flow).

Chorea. St. Vitus' dance (χορεία, a dancing).

Choroiditis. Inflammation of the choroid (χόριον, skin, εἶδος, likeness).

Colica. Colic (κῶλον, the colon).
Congestion. Fulness of blood (*congestio*, from *congero*, to heap up).
Corneitis. Inflammation of the cornea (*cornu*, a horn).
Cyanosis. Blue disease (κύανος, blue).
Cynanche. Quinsy (κύων, a dog, ἄγχω, to strangle).
Cystitis. Inflammation of the bladder (κύστις, a bladder).
Delirium. Wandering (*delirium*, *de*, from, and *lira*, a furrow).
Diabetes. An immoderate flow of urine (διὰ, through, βαίνω, to pass).
Diarrhœa. A flux (διὰ, through, ῥέω, to flow).
Dropsy. (υδρωψ, from ὕδωρ, water).
Dysenteria. (δύς, with difficulty, ἔντερον, the bowels).
Dysmenorrhœa. Difficult menstruation (δύς, difficult, μην, a month, ρέω, to flow).
Dyspepsia. Difficult digestion (δύς, difficult, πέπτω, to concoct).
Dyspnœa. Difficult respiration (δύς, with difficulty, πνέω, to breathe).
Dysuria. Painful micturition (δύς, with difficulty, οὐρέω, to pass urine).
Ecthyma. Cutaneous pustules (ἐκθύω, to break out).
Eczema. Running scab (ἐκζέω, to boil up).
Elephantiasis. Arabian leprosy (ἐλεφαντίασις, from ελεφας, an elephant).
Emphysema. Air in the cellular membrane (εμφύσημα, from ἐμφυσάω, to inflate).
Empyema. Matter in the pleura (ἐν, within, πύον, pus).
Encephalitis. Inflammation of the brain (ἐν, in, κεφαλὴ, head).
Endocarditis. Inflammation of the lining membrane of the heart (ἔνδον, within, καρδία, the heart).
Enteritis. Inflammation of the bowels (ἔντερον, the bowels).
Entozoa. Internal parasitic animals (ἐντὸς, within, ζωὴ, life).
Enuresis. Incontinence of urine (εν, in, οὖρέω, to pass urine).
Ephelis. Freckles (ἐφηλὶς, from ἐπὶ and ἥλιος, the sun).
Epilepsy. Falling sickness (ἐπίληψις, from ἐπιλαμβάνω, to seize upon).
Equinia. Glanders (*equus*, a horse)
Erysipelas. St. Anthony's fire (ἐρυσιπελας, from ἐρύω, to draw, πέλας, adjoining).
Erythema. Inflammatory blush (ἐρύθος, a blush).
Exanthemata. Eruptions on the skin (ἐξανθέω, to blossom).
Febricula. (dim. of *febris*).
Febris. Fever (*ferveo*, to be hot).
Frambœsia. The yaws (*framboise*, Fr., a raspberry).
Gangræna. Gangrene (γραίνω, to eat).
Gastralgia. Pain in the stomach (γαστὴρ, the stomach, ἄλγος, pain).
Gastritis. Inflammation of the stomach (γαστὴρ, the stomach).
Gastrodynia. Pain in the stomach (γαστὴρ, the stomach, ὀδύνη, pain).
Gastro-enteritis. Inflammation of the stomach and bowels (γαστὴρ, the stomach, ἐντέρον, the bowels).
Gengivitis. Inflammation of the gums (*gingivæ*, the gums).
Glossitis. Inflammation of the tongue (γλῶσσα, the tongue).

Gonorrhœa. Purulent discharge from the urethra (γονὴ, seed, ῥέω, to flow).

Hæmatemesis. Vomiting of blood (αἷμα, blood, ἔμεσις, vomiting).

Hæmaturia. Bloody urine (αἷμα, blood, οὐρέω, to void urine).

Hæmoptysis. Spitting of blood (αἷμα, blood, πτύσις, spitting).

Hæmorrhage. Bleeding (αἷμα, blood, ῥήγνυμι, to burst forth).

Hæmorrhois. Piles (αἷμα, blood, ῥέω, to flow).

Hectic. A remittent fever (ἑκτικὸς, habitual).

Hemiplegia. Palsy of one side (ἥμισυς, half, πλήσσω, to strike).

Hepatitis. Inflammation of the liver (ἧπαρ, ἥπατος, the liver).

Herpes. Tetter (ἕρπω, to creep).

Hydrocephalus. Water on the brain (ὕδωρ, water, κεφαλὴ, head).

Hydropericardium. Dropsy of the pericardium (ὕδωρ, water, and pericardium).

Hydrophobia. Canine madness (ὕδωρ, water, φόβος, fear).

Hydrorachis. Water on the spine (ὕδωρ, water, ῥάχις, the spine).

Hydrothorax. Dropsy on the chest (ὕδωρ, water, θώραξ, the chest).

Hypertrophy. Excessive nutrition (ὑπερ, over, τροφὴ, nourishment).

Hypochondriasis. Low spirits (ὑπὸ, under, χόνδρος, cartilage).

Hysteralgia. Pain in the womb (ὑστέρα, the womb, ἄλγος, pain).

Hysteria. Hysterics (ὑστέρα, the womb).

Hysteritis. Inflammation of the womb (ὑστέρα, the womb).

Icterus. Jaundice (ἴκτερος, a yellow bird).

Ichthyosis. Fish-skin (ἰχθυόεις, resembling fish).

Ileus. Obstruction of the bowels (ἰλεὸς, a den).

Impetigo. Running tetter (Lat. *impetigo*, from *impeto*, to assail).

Inflammation. (Lat. *inflammatio*, from *in* and *flamma*).

Influenza. Epidemic catarrh (from *influo*, to abound).

Intus-susceptio. A form of obstruction of the bowels (*intus*, within, and *susceptio*, a taking).

Iritis. Inflammation of the iris (*iris*, a rainbow).

Ischuria renalis. Suppression of urine (ἰσχουρία, suppression of urine; *renalis*, belonging to the kidneys).

Laryngismus stridulus. Spasmodic croup (λαρυγγίζω, to vociferate; *stridulus*, creaking).

Laryngitis. Inflammation of the larynx (λάρυγξ, the larynx).

Lepra. A cutaneous disease (λεπρὸς, scaly).

Leucocythemia. A state allied to anæmia (λευκὸς, white, κύτος, a cell, and αἷμα, blood).

Leucorrhœa. The whites (λευκὸς, white, ρέω, to flow).

Lichen. A cutaneous disease (λειχὴν, the lichen).

Lumbago. Rheumatism in the loins (*lumbus*, the loins).

Lumbricus. (Ascaris lumbricoides) Round worm (*lubricus*, slippery).

Lupus. Noli me tangere (*lupus*, a wolf).

Mania. Furious madness (μαίνομαι, to be furious).

Marasmus. Atrophy (μαραίνω, to wither).

Melancholia. Melancholy (μέλαινα χολὴ, black bile).

Melæna. Hæmorrhage from the bowels (μέλαινα, black).

Melanosis. A morbid product of a black colour (μελας, μέλανος, black).

Meningitis. Inflammation of the membranes of the brain, or of the spinal cord (*μῆνιγξ*, a membrane).

Menorrhagia. Flooding (*μὴν*, a month, *ῥήγνυμι*, to break forth).

Mentagra. Chin welk (*mentum*, the chin, *ἄγρα*, seizure).

Metritis. Inflammation of the womb (*μήτρα*, the womb).

Miliaria. Miliary fever (*milium*, a millet seed).

Mimosis inquieta. The nervous state (*μῖμος*, a mimic, and *inquieta*, restless).

Mollities ossium. Softening of the bones (*mollis*, soft).

Molluscum. A cutaneous disease (*molluscum*, the bunch of the tree acer).

Myelitis. Inflammation of the spinal cord (*μυελὸς*, marrow).

Nephritis. Inflammation of the kidney (*νεφρὸς*, the kidney).

Neuralgia. Nervous pain (*νεῦρον*, a nerve, *ἄλγος*, pain).

Œsophagitis. Inflammation of the gullet (*οἴσω*, to carry, *φάγω*, to eat).

Ophthalmia. Inflammation of the eye (*ὀφθαλμὸς*, the eye).

Osteo-malacia. Softening of the bones (*ὀστέον*, a bone, *μαλακία*, softness).

Otitis. Inflammation of the ear (*ὠτὸς*, of the ear).

Palpitatio. Beating of the heart (*palpito*, to throb).

Paracentesis. Tapping (*παρὰ*, through, *κεντέω*, to pierce).

Paralysis. Palsy (*παρὰλύω*, to relax).

Paraplegia. Palsy of the lower half of the body (*παρὰπλήσσω*, to strike).

Parotitis. Inflammation of the parotid gland (*παρὰ*, near, *ὠτὸς*, of the ear).

Pellagra. Italian leprosy (*pellis agria*, wild skin; or *φελλὸς*, the bark of the cork-tree, and *ἄγριος*, wild).

Pemphigus. Vesicular fever (*πέμφιγος*, of a small blister).

Pericarditis. Inflammation of the pericardium (*περὶ*, around, *καρδία*, the heart).

Peritonitis. Inflammation of the peritoneum (*περὶ*, around, *τείνω*, to extend).

Pertussis. Hooping-cough (*pertussis*, a continual cough).

Pestis. The plague (Lat. *pestis*).

Phlebitis. Inflammation of the veins (*φλέψ*, *φλεβὸς*, a vein).

Phlegmasia dolens. (*φλέγμα*, a burning, and *dolens*, painful).

Phlogosis. Inflammation (*φλόγωσις*, a burning, *φλογόω*, to inflame).

Phrenitis. Inflammation of the brain (*φρὴν*, *φρενὸς*, the mind).

Phthisis. Consumption (*φθίσις*, from *φθίνω*, to corrupt).

Pityriasis. Dandriff (*πίτυρον*, bran).

Plethora. Fulness of blood (*πληθώρα*, fulness).

Pleuritis. Inflammation of the pleura (*πλευρὰ*, the side).

Pleurodyne. Pain in the side (*πλευρὰ*, the side, *ὀδύνη*, pain).

Pneumonia. Inflammation of the substance of the lungs (*πνεύμων*, the lung).

Pneumothorax. Air in the pleura (*πνεῦμα*, air, *θώραξ*, the chest).

Podagra. Gout (*ποδὸς*, of a foot, *ἄγρα*, seizure).

Polypus. (πολὺς, many, ποὺς, a foot).

Porrigo. Scaldhead (*porrigo*, scurf).

Prurigo, Pruritus. (*Prurigo*, itching, *prurio*, to itch).

Psora. The itch (ψώρα).

Psoriasis. Dry scall (ψώρα, the itch).

Puerperal fever. Child-bearing fever (*puer*, a boy, *pario*, to bring forth).

Purpura. Scurvy (*purpura*, a shell-fish yielding a purple dye).

Pyrexia. Fever (πύρεξις, a febrile state).

Pyrosis. Water-brash (πύρωσις, burning).

Rachitis. Rickets (ῥάχις, the back).

Retinitis. Inflammation of the retina (*rete*, a net).

Rheumatism. (ῥεῦμα, a fluxion).

Roseola. Rose-rash (*roseolus*, from *roseus*, rosy).

Rubeola. Measles (*rubeo*, to be red).

Rupia. A cutaneous disease (ῥύπος, filth).

Scabies. The itch (*scabies*, from *scabo*, to scratch).

Scarlatina. Scarlet fever.

Sciatica. Pain in the hip (ἰσχιὰς, from ἴσχιον, the hip).

Sclerotitis. Inflammation of the sclerotic coat of the eye (σκληρὸς, hard).

Scorbutus. Scurvy (Lat. *scorbutus*).

Scrofula. King's evil (*scrofula*, a little pig).

Splenitis. Inflammation of the spleen (σπλὴν, the spleen).

Stomatitis. Inflammation of the mouth (στόμα, the mouth).

Struma. King's evil (στρῶμα, a heaping up).

Sycosis. Chin-welk (συκόω, to convert into a fig).

Syncope. Fainting (συγκόπτω, to cut down).

Synochus, Synocha. Forms of continued fever (συνεχὴς, continuous).

Tabes mesenterica. Abdominal consumption (*tabes*, a consumption, μεσεντέριον, the mesentery).

Tænia. Tape-worm (*tænia*, a riband, from τείνω, to stretch).

Tetanus. Locked jaw (τείνω, to stretch).

Tetanus neonatorum. Infantile tetanus.

Tic doloreux. Neuralgia of the face (Fr. *tic*, a convulsive motion, *doloreux*, painful).

Tonsillitis. Inflammation of the tonsils (*tondeo*, to clip).

Tracheitis. Inflammation of the trachea (τραχεῖα ἀρτηρία, rough artery).

Trichuris. Thread-worm (θριχὸς, of the hair).

Trismus. Locked jaw (τρισμὸς, from τρίζω, to gnash the teeth).

Tympanites. Drum belly (τύμπανοειδής, like a drum).

Typhus. Continued fever (τυφόω, to stupefy).

Urticaria. Nettle rash (*urtica*, a nettle).

Vaccina. Cow-pox (*vaccinus*, belonging to a cow).

Varicella. Chicken-pox (dim. of *varus*, a spot).

Variola. Small-pox (dim. of *varus*, a spot).

Zymotic. Contagious and infectious diseases (ζύμωσις, fermentation, from ζυμόω, to ferment).

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